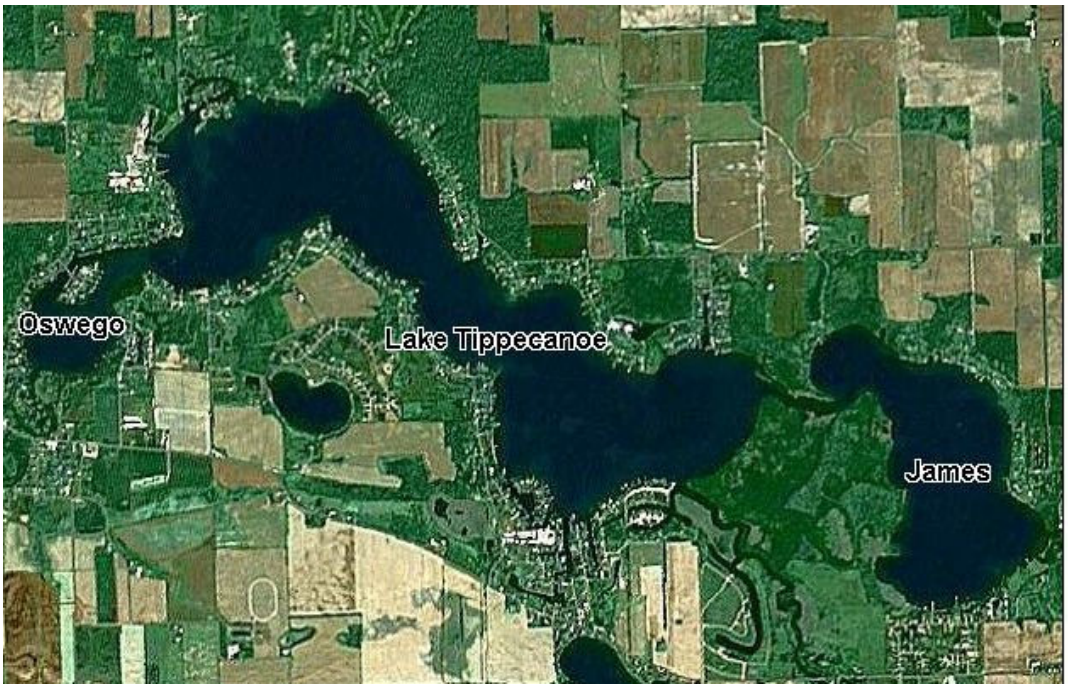

Lake Tippecanoe
Aquatic Vegetation Management Plan
2006 Update

February 15, 2007

Prepared for:
Lake Tippecanoe Property Owners Association
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Executive Summary

Aquatic Control was contracted by the Lake Tippecanoe Property Owners Association to complete aquatic vegetation sampling in order to update their lakewide, long-term integrated aquatic vegetation management plan. Funding for development of this plan was obtained from the Lake Tippecanoe Property Owners Association and the Indiana Department of Natural Resources-Division of Fish and Wildlife as part of the Lake and River Enhancement program (LARE). The update serves as a tool to track changes in the vegetation community, to adjust the action plan as needed, and to maintain eligibility for LARE funds. Items covered include the 2006 sampling results, a review of the 2006 vegetation controls, and updates to the budget and action plans.

Aquatic vegetation is an important component of lakes in Indiana; however, as a result of many factors this vegetation can develop to a nuisance level. Nuisance aquatic vegetation, as used in this paper, describes plant growth that negatively impacts the present uses of the lake including fishing, boating, swimming, aesthetic, and lakefront property values. The primary exotic nuisance species within Lake Tippecanoe are the exotic plants Eurasian watermilfoil (*Myriophyllum spicatum*) and curlyleaf pondweed (*Potamogeton crispus*). The negative impact of these species on native aquatic vegetation, fish populations, water quality, and other factors is well documented and will be discussed in further detail. Eel grass (*Vallisneria Americana*) and filamentous algae is also abundant in the Lake Tippecanoe chain and can create nuisance conditions.

The primary recommendations for plant control within the Lake Tippecanoe chain includes the use of triclopyr herbicide to selectively control Eurasian watermilfoil and along with early season treatments with Aquathol herbicide for control of curlyleaf pondweed throughout the lakes. The goals of the plant controls are to maintain Eurasian watermilfoil and curlyleaf pondweed below 10% frequency of occurrence in all three lakes while maintaining a minimum of 80% vegetative cover of the littoral zone. The 2006 treatments effectively kept milfoil frequency below 10% and allowed for vegetation coverage of greater than 80% in all three lakes. Curlyleaf pondweed was not treated in 2006 due to lack of LARE funding.

It appears that curlyleaf pondweed is taking the place of Eurasian watermilfoil in many areas where long-term milfoil control has occurred. It is estimated that up to 104 acres of curlyleaf pondweed may require treatment next season. In addition, it is recommended that LTPOA pursue funding for control of 34 acres of Eurasian watermilfoil with Renovate herbicide. A Tier II survey and treatment map survey should be completed in early April prior to the curlyleaf treatment. The Tier II survey will be used to document changes in the spring plant community. A follow-up Tier II survey should be completed in late summer in order to monitor the success of the treatments and changes in the native plant community. The 2007 cost estimate is $52,250 for herbicide treatment and $6,000 for surveying and planning for a total of $58,250.

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1.0 INTRODUCTION

This report was created in order to update the Lake Tippecanoe Aquatic Vegetation Management Plan. The plan update was funded by the Lake Tippecanoe Property Owners Association (LTPOA) and the Indiana Department of Natural Resources (IDNR) Lake and River Enhancement (LARE) program. The update serves as a tool to track changes in the vegetation community, to adjust the action plan as needed, and to maintain eligibility for LARE funds. Items covered include the 2006 sampling results, a review of the 2006 vegetation controls, and updates to the budget and action plans. Once reviewed and approved, the update should be included in the original vegetation management plan, following the 2005 update and prior to the appendix.

2.0 2006 PLANT SAMPLING

Two surveys were completed on Tippecanoe, Oswego, and James (Little Tippe) Lakes in order to document changes in the plant community and to determine the success or failure of control techniques. A Tier I survey was completed for all three lakes on May 26 and Tier I and II surveys were completed on all three lakes on August 2nd and 3rd, 2006.

2.1 Lake Tippecanoe Sampling Results

2.1.1 May Survey, Lake Tippecanoe

On May 26, 2006 a Tier I survey was completed on Lake Tippecanoe. The primary purpose of this survey was to create a Eurasian watermilfoil treatment map. In addition, this survey served as a tool to track changes in the vegetation community. A Secchi disk reading was taken prior to sampling and was found to be 11.0 feet. Plants were present to a maximum depth of 19 feet. The total littoral zone size was estimated to be 285.3 acres. Fourteen different species were observed in 15 different plant beds. Curlyleaf pondweed (*Potamogeton crispus*), an invasive exotic species, was present in all plant beds. The only other invasive exotic species observed was Eurasian watermilfoil (*Myriophylum spicatum*). Eurasian watermilfoil scored an abundance rating of 3 or higher in beds 1, 8, 13, and 15 (Table 1 and Figure 1). These beds encompassed an 11.1-acre area. Another area of concern was plant bed 6 located at the east end of lake Tippecanoe. This bed was found to be 29.1 acres. Curlyleaf pondweed was very dense in this area and had reached the surface throughout the majority of bed 6.

Table 1. Lake Tippecanoe, Tier I Survey Results, May 26, 2006.

Lake: Tippecanoe			**Number of plant beds: 15**							**Littoral zone max depth: 19'**					
Date: 5/26/06			**Number of species: 14**												
Secchi: 15.0'			**Littoral zone size: 285.3**												
Plant Bed I.D.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Plant Bed Size (acres)	**1.8**	**92.2**	**4.1**	**7.0**	**14.1**	**29.1**	**0.5**	**1.7**	**21.8**	**35.6**	**58.0**	**3.1**	**5.8**	**8.7**	**1.8**
Eurasian watermilfoil	4	1	-	-	-	1	1	3	-	-	1	1	4	-	4
curlyleaf pondweed	2	3	1	1	1	4	1	3	2	1	3	2	1	2	2
Richardson's pondweed	1	1	1	1	1	-	-	-	2	1	1	1	1	2	1
common coontail	1	3	-	-	-	-	-	1	2	-	3	3	-	-	-
chara	-	1	2	2	2	-	1	-	1	2	-	1	1	2	-
flatstem pondweed	-	1	-	-	-	1	-	-	-	-	1	-	-	-	-
sago pondweed	-	1	-	-	-	-	-	-	2	-	-	-	-	-	-
variable watermilfoil	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-
eel grass	-	1	-	1	-	-	-	-	-	1	1	-	-	1	-
slender naiad	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
American elodea	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-
spatterdock	-	-	-	-	-	-	4	1	-	-	-	-	-	-	-
white water lily	-	-	-	-	-	-	1	1	-	-	-	-	1	-	-
largeleaf pondweed	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-

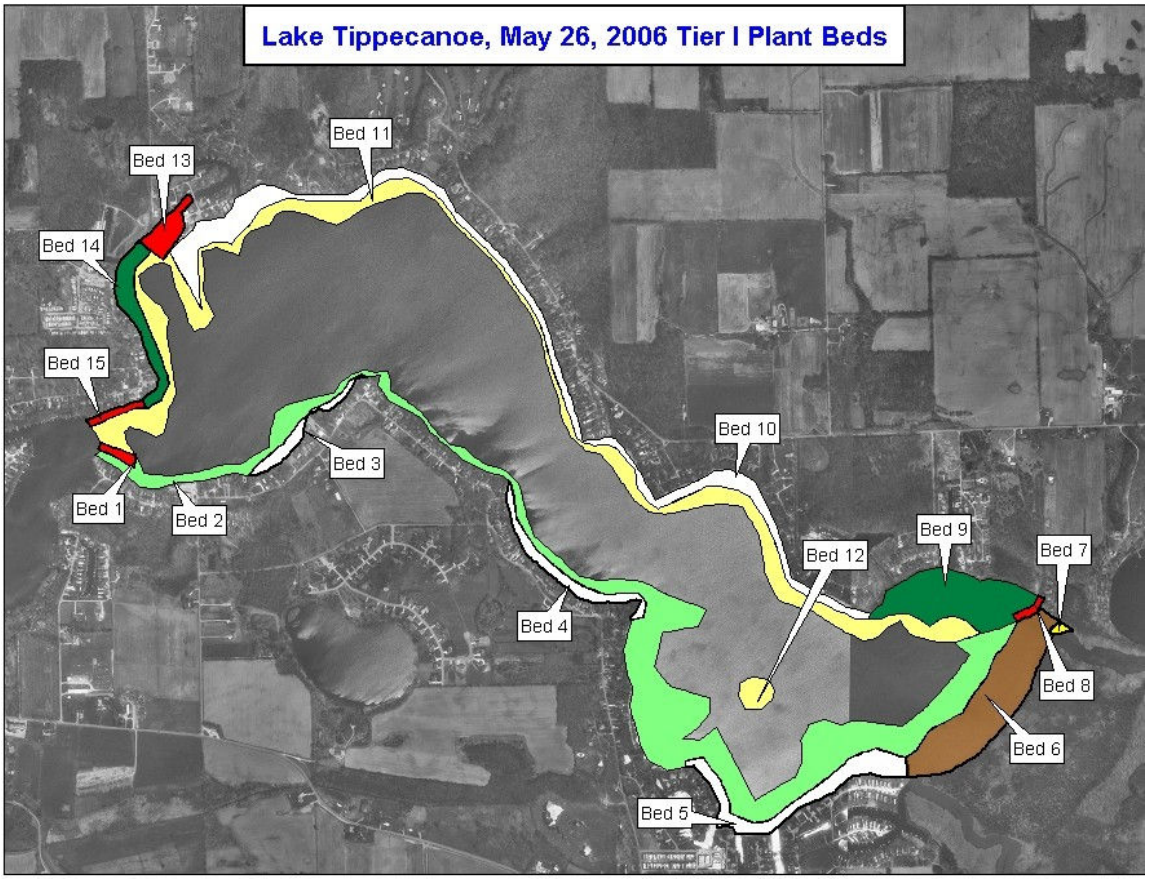

Figure 1. Lake Tippecanoe, Tier I plant bed, May 26, 2006.

2.1.2 August Survey-Lake Tippecanoe

A second round of sampling was completed on Lake Tippecanoe on August 2, 2006. Tier I and Tier II surveys were completed at this time. A Secchi measurement was taken prior to sampling and found to be 7.5 feet. The Tier I survey revealed 14 different plant beds and 12 different species. Plants were growing to a maximum depth of 19 feet. The littoral zone area was estimated to be 282.6 acres. Eurasian watermilfoil was the only invasive exotic species observed. Eurasian watermilfoil never received a score higher than one and was found in only five plant beds (Table 2). Curlyleaf pondweed was not observed during this survey. Eel grass (*Vallisneria americana*) was the most abundant species and was observed in all but three plant beds. Plant bed 6 raised the most concern from a plant management perspective (Table 2 & Figure 2). In the May survey this bed was dominated by curlyleaf pondweed, but in the August survey this bed was dominated by Lyngbya algae mats with very little rooted submersed vegetation. This is the same area that is being considered for an Eco-zone.

Table 2. Lake Tippecanoe, Tier I Survey Results, August 2, 2006.

Lake: Tippecanoe	**Number of plant beds: 14**						**Littoral zone max depth: 19**							
Date: 8/2/06	**Number of species: 12**													
Secchi: 7.5'	**Littoral zone size: 282.6**													
Plant Bed I.D.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
Plant Bed Size (acres)	**55.1**	**2.8**	**25.9**	**20.5**	**7.6**	**78.2**	**1.8**	**0.5**	**0.1**	**55.2**	**5.4**	**26.2**	**0.4**	**3.0**
Eel grass	3	-	4	3	4	1	-	1	1	3	1	2	-	2
white water lily	1	-	-	-	1	-	2	-	-		-	-	4	-
variable pondweed	2	-	1	1		1	-	-	-	1	-	-	-	1
Richardson's pondweed	1	1	2	1	2	1	-	-	-	2	1	1	-	2
Chara	2	1	1	2	1		-	1	-	1	1	1	1	-
sago pondweed	2	-	2	1	2	1	-	-	-	1	-	-	-	-
Eurasian watermilfoil	1	-	-	-	1	1	-	-	-	1	-	-	-	1
Illinois pondweed	1	-	1	-	-	-	-	-	-	1	-	-	-	1
American elodea	1	-	-	-	1	-	-	-	-	-	-	-	-	-
common coontail	1	-	-	-		1	-	-	-	1	-	-	-	2
spatterdock	-	-	-	-	1	-	4	4	4		-	-	-	-
largeleaf pondweed	-	-	-	-	-	-	-	-	-	-	-	-	1	-

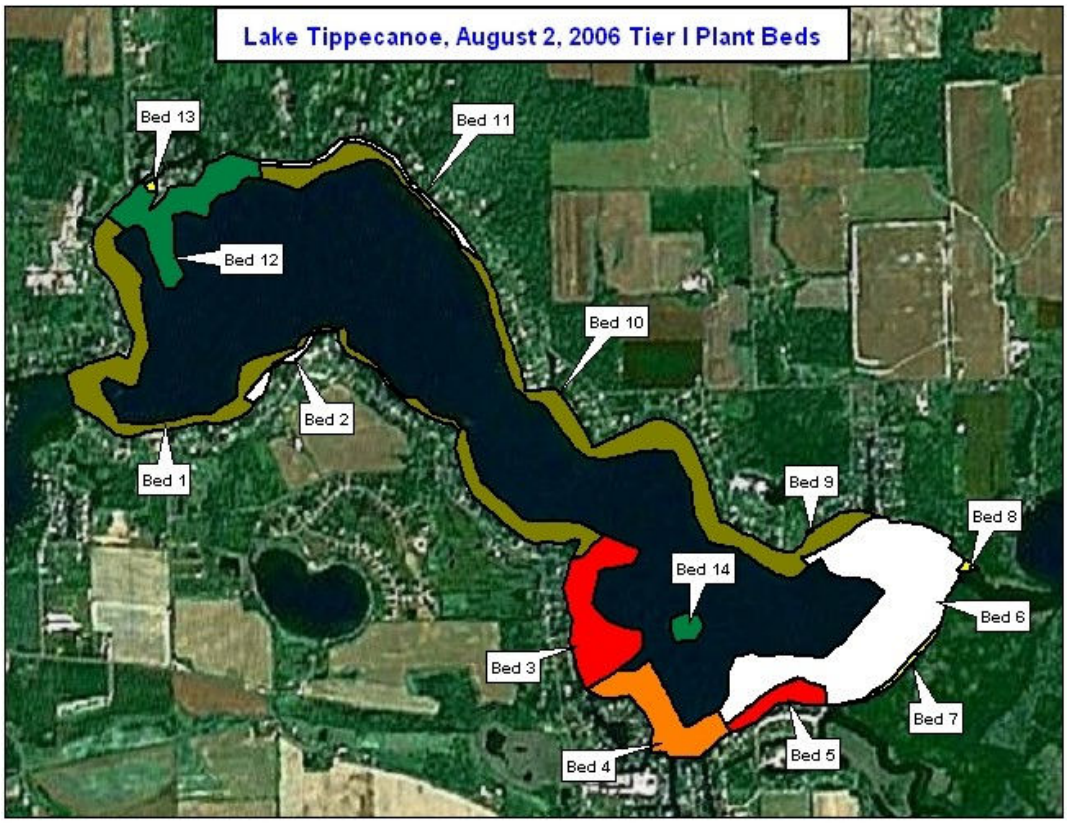

Figure 2. Lake Tippecanoe, Tier I plant beds, August 2, 2006.

On August 2, 2006 a Tier II survey was completed on Lake Tippecanoe following the Tier I survey. A total of 90 sites were sampled throughout the littoral zone (29 sites from 0-5ft, 27 sites 5-10ft, 24 sites 10-15 ft, and 10 sites 15-20ft). Results of the sampling are listed in Table 3. Overall aquatic vegetation distribution and density is illustrated in Figure 3. Aquatic vegetation was present at 78 of the sites and native aquatic vegetation was present at 76 sites. A total of 16 species were collected of which 14 were native. The maximum number of species per site was 5 while the mean species per site was 1.87.

Table 3. Occurrence and abundance of submersed aquatic plants in Lake Tippecanoe August 2, 2006.

Occurrence and abundance of submersed aquatic plants in Tippecanoe Lake

County:	Kosciusko	Sites with plants:	78	Mean species/site:	1.87		
Date:	8/2/2006	Sites with native plants:	76	Standard error (ms/s):	0.13		
Secchi (ft):	7	Number of species:	16	Mean native species/site:	1.72		
Maximum plant depth (ft):	17	Number of native species:	14	Standard error (mns/s):	0.13		
Trophic status	Mesotrophic	Maximum species/site:	5	Species diversity:	0.84		
Total sites:	90			Native species diversity:	0.82		

All depths (0 to 20 ft)	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
eel grass	55.6	44.4	5.6	13.3	36.7	32.9
common coontail	35.6	64.4	5.6	7.8	22.2	18.7
Chara spp.	25.6	74.4	3.3	7.5	14.4	12.4
water stargrass	11.1	88.9	1.1	0.0	10.0	4.0
Eurasian watermilfoil	10.0	90.0	0.0	3.3	6.7	2.9
Richardson's pondweed	10.0	90.0	0.0	0.0	10.0	3.3
spiny naiad	6.7	93.3	0.0	2.2	4.4	4.4
sago pondweed	5.6	94.4	0.0	1.1	4.4	1.1
leafy pondweed	5.6	94.4	0.0	1.1	4.4	1.1
northern watermilfoil	4.4	95.6	0.0	0.0	4.4	1.3
slender naiad	4.4	95.6	1.1	1.1	2.2	1.8
curlyleaf pondweed	4.4	95.6	1.1	1.1	2.2	1.8
American elodea	3.3	96.7	1.1	0.0	2.2	0.7
variable pondweed	2.2	97.8	0.0	1.1	1.1	0.4
variable watermilfoil	1.1	98.9	0.0	0.0	1.1	0.2
whorled watermilfoil	1.1	98.9	0.0	1.1	0.0	0.2

Depth: 0 to 5 ft	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
Chara	65.6	34.4	9.4	18.8	37.5	30.6
eel grass	59.4	40.6	0.0	21.9	37.5	29.4
slender naiad	9.4	90.6	3.1	3.1	3.1	4.4
curlyleaf pondweed	9.4	90.6	3.1	0.0	6.3	3.1
American elodea	6.3	93.7	3.1	0.0	3.1	1.3
sago pondweed	6.3	93.7	0.0	0.0	6.3	1.3
leafy pondweed	6.3	93.7	0.0	0.0	6.3	1.3
Richardson's pondweed	6.3	93.7	0.0	0.0	6.3	1.3
variable pondweed	6.3	93.7	0.0	3.1	3.1	1.3
water stargrass	6.3	93.7	0.0	0.0	6.3	1.3
common coontail	3.1	96.9	3.1	0.0	0.0	0.6
Eurasian watermilfoil	3.1	96.9	0.0	0.0	3.1	0.6
northern watermilfoil	3.1	96.9	0.0	0.0	3.1	1.9

Depth: 5 to 10 ft	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
eel grass	83.3	16.7	8.3	12.5	63.5	63.3
common coontail	37.5	62.5	0.0	12.5	25.0	9.2
water stargrass	25.0	75.0	0.0	0.0	25.0	8.3
Richardson's pondweed	12.5	87.5	0.0	0.0	12.5	5.8
Chara spp.	8.3	91.7	0.0	4.2	4.2	5.8
Eurasian watermilfoil	8.3	91.7	0.0	4.2	4.2	1.7
leafy pondweed	8.3	91.7	0.0	0.0	8.3	1.7
American elodea	4.2	95.8	0.0	0.0	4.2	0.8
sago pondweed	4.2	95.8	0.0	4.2	0.0	0.8
northern watermilfoil	4.2	95.8	0.0	0.0	4.2	0.8
variable watermilfoil	4.2	95.8	0.0	0.0	4.2	0.8
whorled watermilfoil	4.2	95.8	0.0	4.2	0.0	0.8
slender naiad	4.2	95.8	0.0	0.0	4.2	0.8

Depth: 10 to 15 ft	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
common coontail	58.3	61.7	4.2	8.3	45.8	40.0
eel grass	45.8	54.2	12.5	8.3	25.0	20.8
Eurasian watermilfoil	20.8	79.2	0.0	8.3	12.5	7.5
spiny naiad	20.8	79.2	0.0	8.3	12.5	12.5
Richardson's pondweed	16.7	83.3	0.0	0.0	16.7	5.0
sago pondweed	8.3	91.7	0.0	0.0	8.3	1.7
northern watermilfoil	8.3	91.7	0.0	0.0	8.3	1.7
water stargrass	8.3	91.7	0.0	4.2	4.2	5.0
leafy pondweed	4.2	95.8	0.0	4.2	0.0	0.8
curlyleaf pondweed	4.2	95.8	0.0	4.2	0.0	2.5

Depth: 15 to 20 ft	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
common coontail	80.0	20.0	30.0	20.0	30.0	48
Eurasian watermilfoil	10.0	90.0	0.0	0.0	10.0	2
spiny naiad	10.0	90.0	0.0	0.0	10.0	10

AQUATIC CONTROL

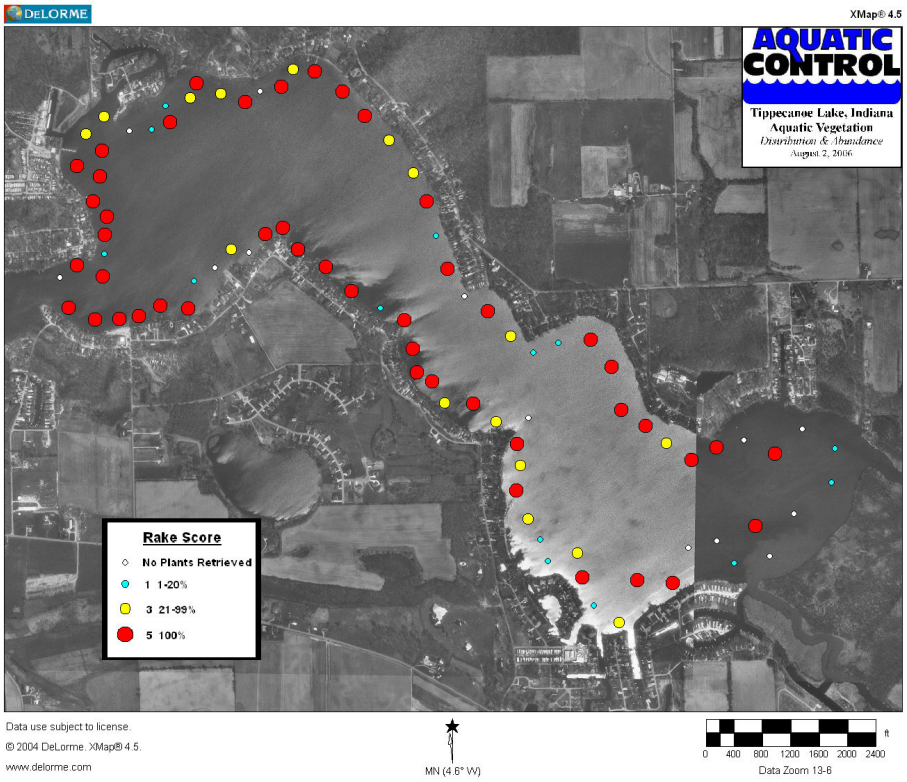

Figure 3. Lake Tippecanoe, overall aquatic vegetation distribution and density, August 2, 2006.

Eel grass was present at the highest percentage of sample sites (55.6%) and also the highest dominance rating (Figure 4). Common coontail (*Ceratophyllum demersum*) ranked second in site frequency (35.6%) and was more dominant in deep water (Figure 5). Eurasian watermilfoil was found at 10% of the sample sites (Figure 6). Curlyleaf pondweed was present at only 4.4% of sample sites (Figure 7).

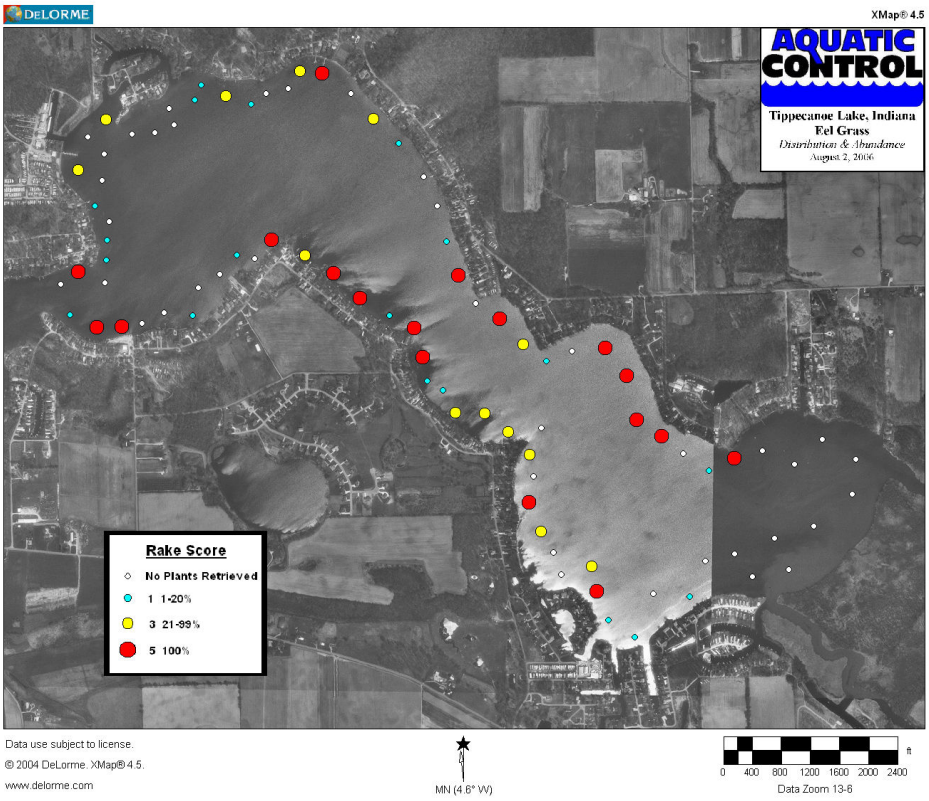

Figure 4. Lake Tippecanoe, eel grass distribution and abundance, August 2, 2006.

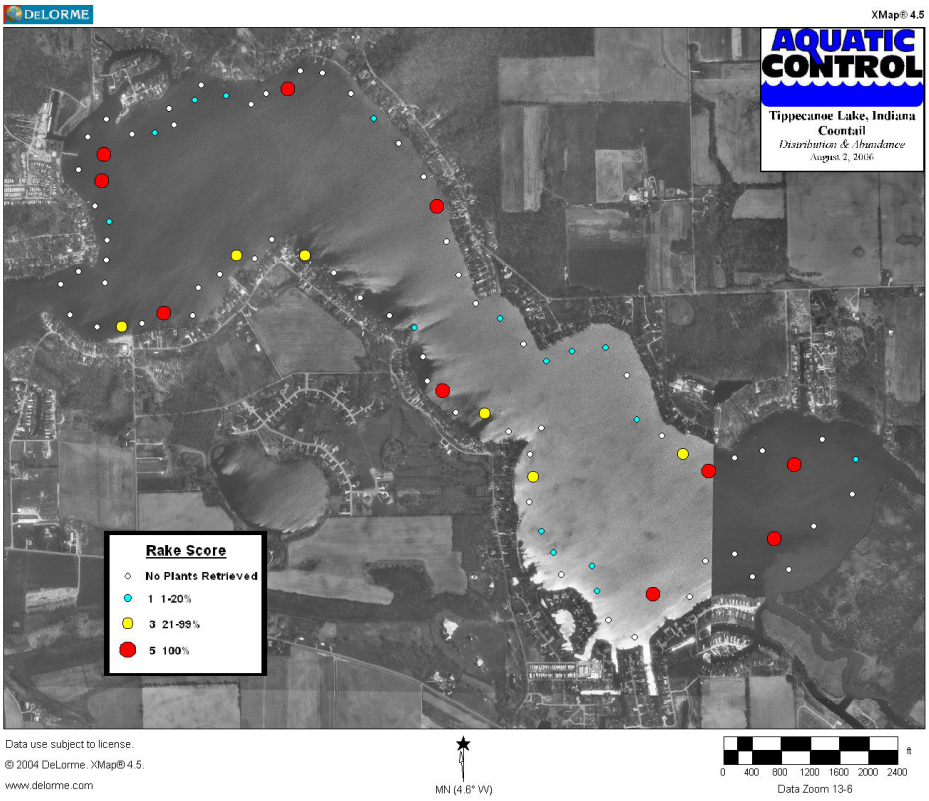

Figure 5. Lake Tippecanoe, coontail distribution and abundance, August 2, 2006.

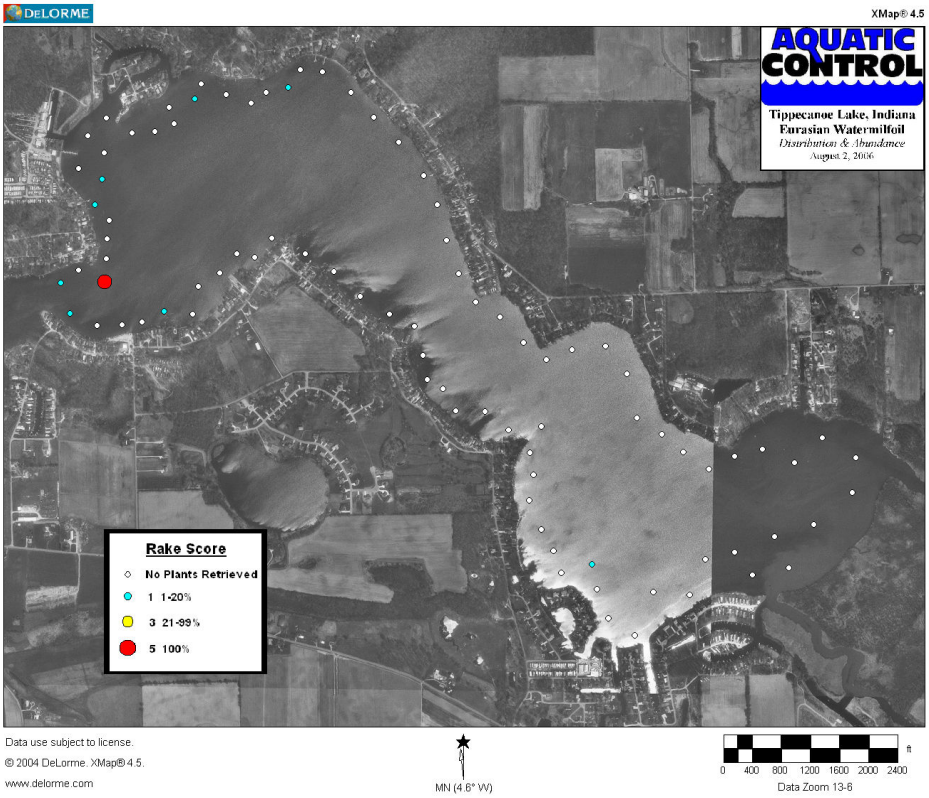

Figure 6. Lake Tippecanoe, Eurasian watermilfoil distribution and abundance, August 2, 2006.

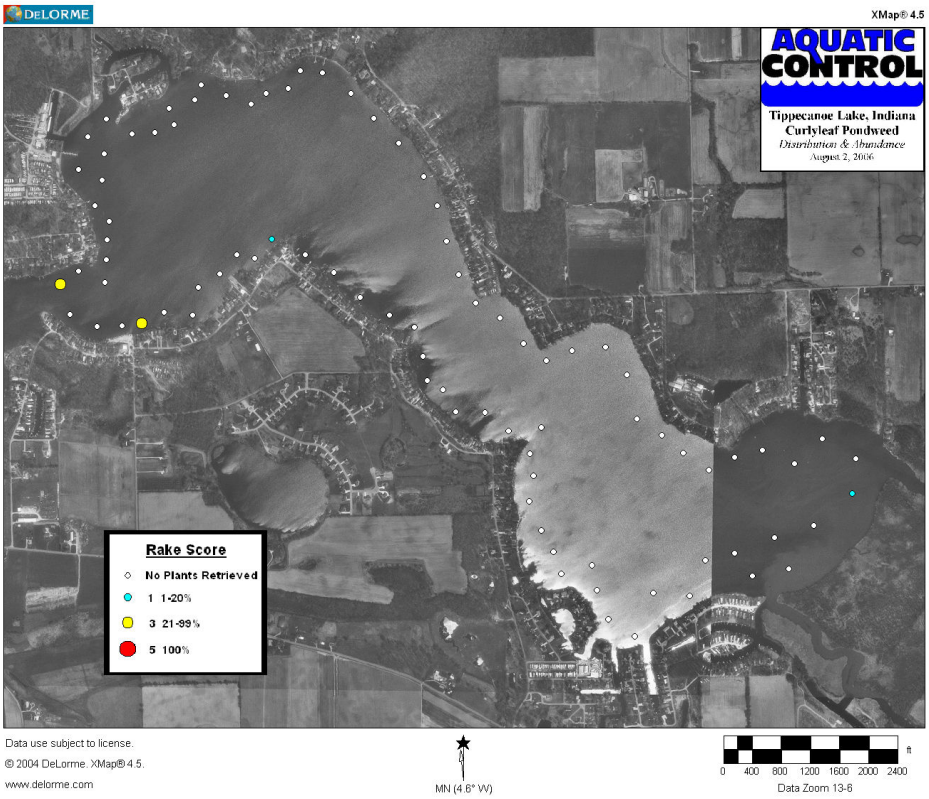

Figure 7. Lake Tippecanoe, curlyleaf pondweed distribution and abundance, August 2, 2006.

2.2 Oswego Lake Sampling Results

2.2.1 May Survey-Oswego Lake

On May 26, 2006 a Tier I survey was completed on Oswego Lake. A Secchi disk reading was taken prior to sampling and was found to be 17.0 feet. Plants were present to a maximum depth of 23 feet. The total littoral zone size was estimated to be 61.3 acres. Seventeen different species were observed in six different plant beds. Eurasian watermilfoil and curlyleaf pondweed were observed in all but one of the plant beds. Eurasian watermilfoil scored an abundance rating of 3 or higher in beds 2 and 4 (Table 4 and Figure 8). These beds included an area of approximately 19.2 acres. Curlyleaf pondweed was received a density rating of 2 or higher in plant beds 1-4 which totaled approximately 46.6 acres.

Table 4. Oswego Lake Tier I Survey, May 26, 2006.

Lake: Oswego			**Number of plant beds: 6**			
Date: 5/26/06			**Number of species: 17**			
Secchi: 17'			**Littoral zone size: 61.3**			
Plant Bed I.D.	**1**	**2**	**3**	**4**	**5**	**6**
Plant Bed Size (acres)	**18.7**	**18.0**	**8.7**	**1.2**	**0.9**	**13.8**
chara	3	2	2	1	1	1
Eurasian watermilfoil	1	3	1	3	-	1
curlyleaf pondweed	2	3	2	3	-	1
Richardson's pondweed	1	1	1	1	-	1
Illinois pondweed	1	1	1	-	-	1
variable watermilfoil	-	1	-	-	-	-
eel grass	1	1	-	-	-	1
American elodea	-	1	-	-	-	1
spatterdock	-	1	-	-	3	-
horned pondweed	-	1	-	-	-	-
small pondweed	-	1	-	-	-	-
common coontail	-	1	2	1	-	4
white water lily	-	-	1	-	1	-
button bush	-	-	-	-	1	-
common arrowhead	-	-	-	-	1	-
pickeral weed	-	-	-	-	1	-
common cattail	-	-	-	-	1	-

Figure 8. Oswego Lake, Tier I plant beds, May 26, 2006.

2.2.2 August survey, Oswego Lake

A second round of sampling was completed on Oswego Lake on August 2, 2006. Tier I and Tier II surveys were completed at this time. A Secchi measurement was taken prior to sampling and found to be 7.5 feet. The Tier I survey revealed 6 different plant beds and 22 different species. Plants were growing to a maximum depth of 20 feet. The littoral zone area was estimated to be 57.1 acres. Eurasian watermilfoil and purple loosestrife were the only invasive exotic species observed. Eurasian watermilfoil never received a score higher than one and was found in only two plant beds (Table 5). Purple loosestrife (*Lythrum salicaria*) was observed in the shoreline areas of beds 1 and 5. Curlyleaf pondweed was not observed during this survey. Eel grass was the most abundant species and was observed in all plant beds except bed 6. Eel grass received a density rating of either 2 or 3 in the beds where it was observed. Bed 4 was comprised of a rooted floating/emergent plant called sacred lotus (*Nelumbo lucifera*). This is an exotic species that, according to residents, has been present in this area for several decades. This bed should be watched closely in order to make sure that it does not spread to other areas of the lake.

Table 5. Oswego Lake Tier I Survey Results, August 2, 2006.

Lake: Oswego	Number of plant beds: 6					
Date: 8/2/06	Number of species: 22					
Secchi: 7.5'	Littoral zone size: 57.1					
Plant Bed I.D.	**1**	**2**	**3**	**4**	**5**	**6**
Plant Bed Size (acres)	**17.1**	**6.9**	**14.3**	**0.4**	**5.9**	**12.5**
Chara	3	1	2	1	2	1
eel grass	3	3	3	2	2	-
spatterdock	1	-	1	-	3	-
white water lily	1	-	1	-	3	-
Richardson's pondweed	2	1	2	-	1	1
Illinois pondweed	1	1	2	-	1	-
sago pondweed	1	-	-	-	1	-
small pondweed	1	-	1	-	-	-
coontail	1	3	1	-	-	4
American water willow	1	-	-	-	-	-
purple loosestrife	1	-	-	-	2	-
swamp rose mallow	1	-	-	-	1	-
American bulrush	1	-	-	-	-	-
common cattail	1	-	-	-	-	-
variable watermilfoil	1	-	1	-	-	-
water stargrass	1	-	-	-	-	-
Eurasian watermilfoil	-	-	1	-	-	1
largeleaf pondweed	-	-	1	-	-	-
slender naiad	-	-	1	-	-	1
sacred lotus	-	-	-	4	-	-
pickeral weed	-	-	-	-	1	-
variable pondweed	-	-	-	-	-	1
American elodea	-	-	-	-	-	1

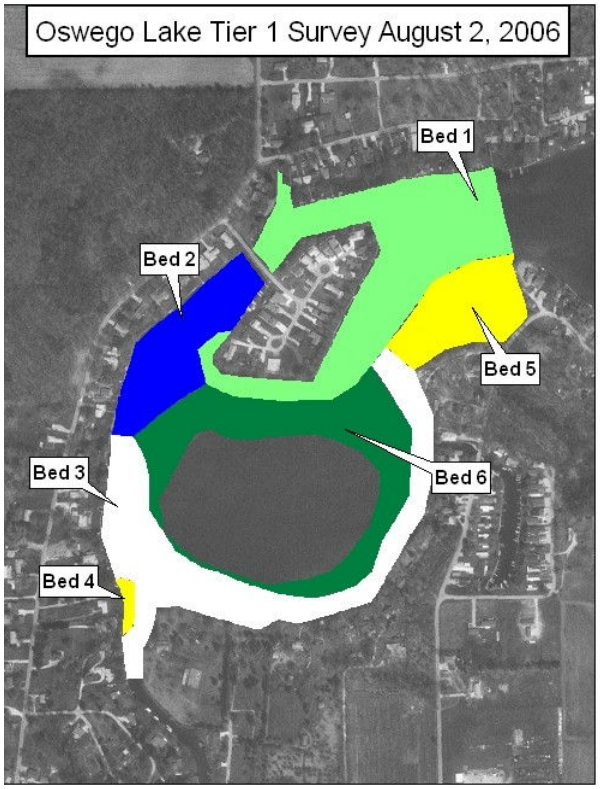

Figure 9. Oswego Lake, Tier I plant beds, August 2, 2006.

On August 2, 2006 a Tier II survey was completed on Oswego Lake following the Tier I survey. A total of 40 sites were sampled throughout the littoral zone (10 sample sites from 0-5ft, 10 sites 5-10ft, 10 sites 10-15 ft, and 10 sites 15-20ft). Results of the sampling are listed in Table 6. Overall aquatic vegetation distribution and density is illustrated in Figure 10. Aquatic vegetation was present at 34 of the sites. A total of 14 species were collected of which 13 were native. The maximum number of species per site was 4 while the mean species per site was 1.90.

Table 6. Occurrence and Abundance of Submersed Aquatic Plants In Oswego Lake, August 2, 2006.

Occurrence and abundance of submersed aquatic plants in Oswego Lake								
County:	Kosciusko	Sites with plants:	34	Mean species/site:	1.90			
Date:	8/2/2006	Sites with native plants:	34	Standard error (ms/s):	0.18			
Secchi (ft):	7.5	Number of species:	14	Mean native species/site:	1.78			
Maximum plant depth (ft):	20	Number of native species:	12	Standard error (mns/s):	0.17			
Trophic status	Mesotrophic	Maximum species/site:	4	Species diversity:	0.82			
Total sites:	40			Native species diversity:	0.80			
All depths (0 to 20 ft)	**Frequency of**	**Rake score frequency per species**				**Plant Dominance**		
Species	**Occurrence**	**0**	**1**	**3**	**5**			
eel grass	55.0	45.0	12.5	12.5	30.0	20.0		
common coontail	45.0	55.0	12.5	12.5	20.0	24.0		
Chara	30.0	70.0	2.5	5.0	22.5	18.0		
slender naiad	12.5	87.5	5.0	7.5	0.0	2.5		
Eurasian watermilfoil	7.5	92.5	0.0	7.5	0.0	1.5		
Richardson's pondweed	7.5	92.5	2.5	2.5	2.5	1.5		
variable pondweed	7.5	92.5	0.0	2.5	5.0	3.5		
American elodea	5.0	95.0	0.0	0.0	5.0	1.0		
Sago pondweed	5.0	95.0	0.0	2.5	2.5	3.0		
curlyleaf pondweed	5.0	95.0	0.0	2.5	2.5	1.0		
spiny naiad	2.5	97.5	0.0	0.0	2.5	0.5		
Flatstem pondweed	2.5	97.5	0.0	2.5	0.0	0.5		
Illinois pondweed	2.5	97.5	0.0	2.5	0.0	0.5		
variable watermilfoil	2.5	97.5	2.5	0.0	0.0	0.5		
Depth: 0 to 5 ft	**Frequency of**	**Rake score frequency per species**				**Plant Dominance**		
Species	**Occurrence**	**0**	**1**	**3**	**5**			
eel grass	80.0	20.0	10.0	10.0	60.0	44.0		
Chara	60.0	40.0	0.0	0.0	60.0	28.0		
common coontail	20.0	80.0	0.0	0.0	20.0	8.0		
spiny naiad	10.0	90.0	0.0	0.0	10.0	2.0		
Sago pondweed	10.0	90.0	0.0	0.0	10.0	10.0		
Flatstem pondweed	10.0	90.0	0.0	10.0	0.0	2.0		
Richardson's pondweed	10.0	90.0	0.0	0.0	10.0	2.0		
variable pondweed	10.0	90.0	0.0	0.0	10.0	6.0		
slender naiad	10.0	90.0	10.0	0.0	0.0	2.0		
curlyleaf pondweed	10.0	90.0	0.0	10.0	0.0	2.0		
Depth: 5 to 10 ft	**Frequency of**	**Rake score frequency per species**				**Plant Dominance**		
Species	**Occurrence**	**0**	**1**	**3**	**5**			
eel grass	80.0	20.0	10.0	30.0	40.0	20.0		
common coontail	50.0	50.0	0.0	30.0	20.0	26.0		
Chara	50.0	50.0	0.0	20.0	30.0	42.0		
Eurasian watermilfoil	20.0	80.0	0.0	20.0	0.0	4.0		
slender naiad	20.0	80.0	20.0	20.0	0.0	4.0		
American elodea	10.0	90.0	0.0	0.0	10.0	2.0		
Sago pondweed	10.0	90.0	0.0	10.0	0.0	2.0		
Richardson's pondweed	10.0	90.0	0.0	10.0	0.0	2.0		
variable pondweed	10.0	90.0	0.0	0.0	10.0	2.0		
Illinois pondweed	10.0	90.0	0.0	10.0	0.0	2.0		
Depth: 10 to 15 ft	**Frequency of**	**Rake score frequency per species**				**Plant Dominance**		
Species	**Occurrence**	**0**	**1**	**3**	**5**			
eel grass	60.0	40.0	30.0	10.0	20.0	16.0		
common coontail	50.0	50.0	0.0	10.0	40.0	46.0		
slender naiad	20.0	80.0	10.0	10.0	0.0	4.0		
Chara	10.0	90.0	10.0	0.0	0.0	2.0		
Eurasian watermilfoil	10.0	90.0	0.0	10.0	0.0	2.0		
American elodea	10.0	90.0	0.0	0.0	10.0	2.0		
curlyleaf pondweed	10.0	90.0	0.0	0.0	10.0	2.0		
variable pondweed	10.0	90.0	0.0	10.0	0.0	6.0		
variable watermilfoil	10.0	90.0	10.0	0.0	0.0	2.0		
Depth: 15 to 20 ft	**Frequency of**	**Rake score frequency per species**				**Plant Dominance**		
Species	**Occurrence**	**0**	**1**	**3**	**5**			
common coontail	60.0	40.0	50.0	10.0	0.0	16.0		
Richardson's pondweed	10.0	90.0	10.0	0.0	0.0	2.0		

AQUATIC CONTROL

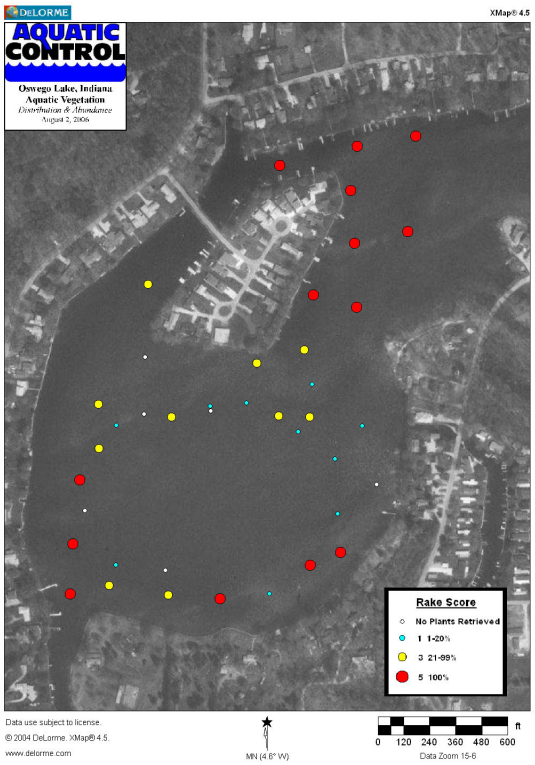

Figure 10. Oswego Lake, aquatic vegetation distribution and abundance, August 2, 2006

Eel grass was present at the highest percentage of sample sites (55.0%) and had the second highest dominance rating (Figure 11). Common coontail ranked second in site frequency (45.0%) and was more dominant in deep water (Figure 12). Eurasian watermilfoil was found at 7.5% of the sample sites (Figure 13). Curlyleaf pondweed was present at only 5.0% of sample sites (Figure 14).

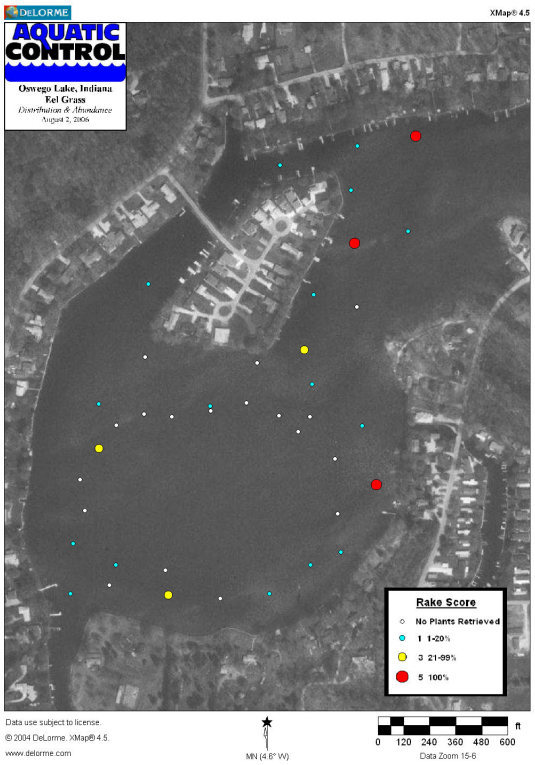

Figure 11. Oswego Lake, eel grass distribution and abundance, August 2, 2006

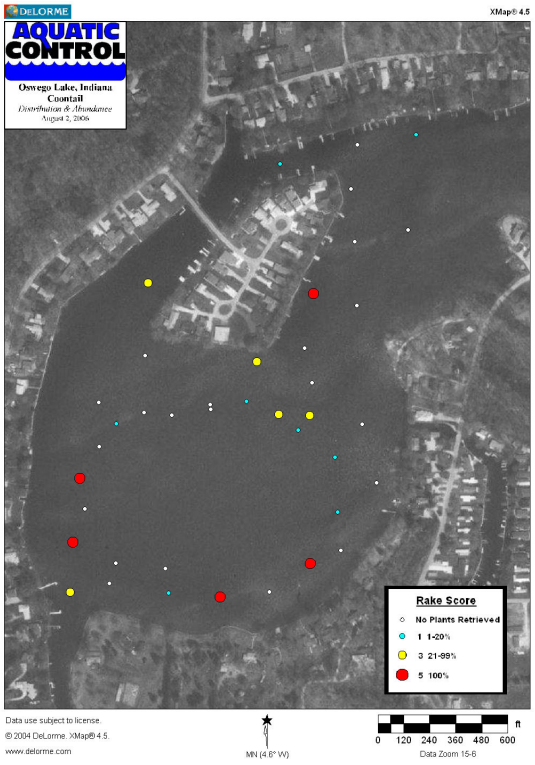

Figure 12. Oswego Lake, common coontail distribution and abundance, August 2, 2006

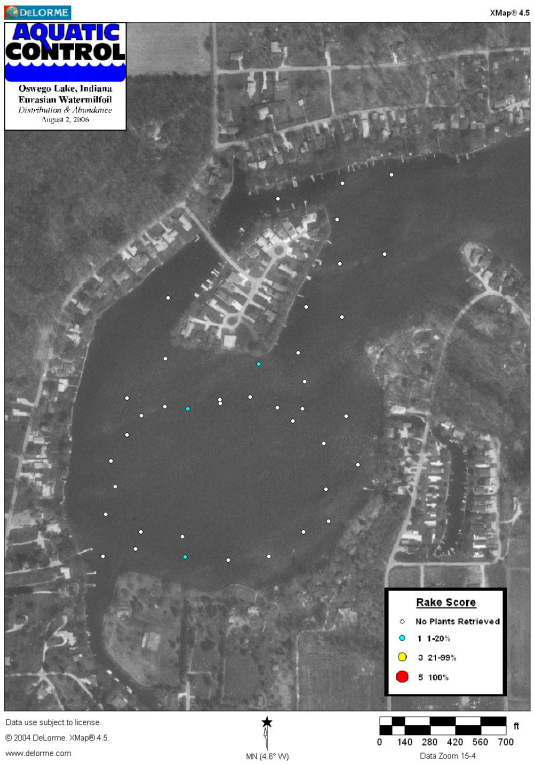

Figure 13. Oswego Lake, Eurasian watermilfoil distribution and abundance, August 2, 2006.

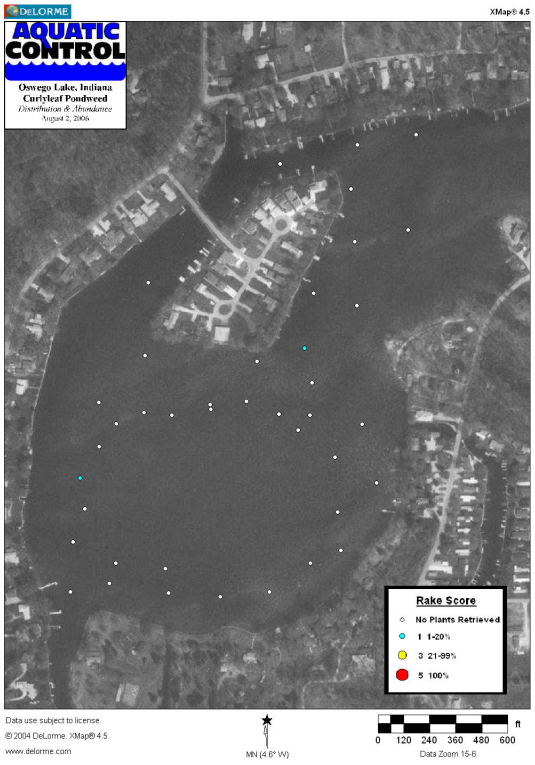

Figure 14. Oswego Lake, curlyleaf pondweed distribution and abundance, August 2, 2006.

2.3 James Lake Sampling Results

2.3.1 May Survey, James Lake

On May 26, 2006 a Tier I survey was completed on James Lake. A Secchi disk reading was taken prior to sampling and was found to be 11.0 feet. Plants were present to a maximum depth of 18 feet. The total littoral zone size was estimated to be 95.7 acres. Fifteen different species were observed in thirteen different plant beds. Curlyleaf pondweed was the most abundant submersed species and was found in all but one plant bed. Eurasian watermilfoil received an abundance rating of 4 in three plant beds totaling 8.4 acres (Table 7 and Figure 15).

Table 7. James Lake Tier I Survey Results, May 26, 2006.

Lake: Little Tippe (James)			**Number of plant beds: 13**									**Littoral zone max depth: 18**	
Date: 5/26/06			**Number of species: 15**										
Secchi: 11.0'			**Littoral zone size: 95.7**										
Plant Bed I.D.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Plant Bed Size (acres)	**1.5**	**40.5**	**1.5**	**4.5**	**3.1**	**0.9**	**10.9**	**1.3**	**4.0**	**7.5**	**13.4**	**1.0**	**5.6**
spatterdock	4	-	1	-	-	4	-	-	-	-	-	4	-
white water lily	1	-	3	-	-	2	-	-	-	-	-	2	-
common cattail	3	-	-	-	-	2	-	-	-	-	-	1	-
button bush	1	-	-	-	-	-	-	-	-	-	-	-	-
arrow arum	1	-	-	-	-	-	-	-	-	-	-	-	-
common coontail	1	2	1	1	2	-	2	2	2	-	1	2	1
curlyleaf pondweed	1	3	1	1	3	-	2	2	2	1	3	1	4
Eurasian watermilfoil	-	1	1	-	4	-	1	4	4	-	1	-	1
American elodea	-	1	-	-	-	-	-	-	-	-	1	2	-
Eel grass	-	1	-	1	-	-	-	-	-	-	-	-	-
Chara	1	1	-	2	1	1	1	-	-	1	1	-	1
sago pondweed	-	-	-	-	-	1	3	2	-	-	-	-	-
horned pondweed	-	-	-	-	-	-	-	-	-	1	1	1	-
small pondweed	-	-	-	-	-	-	-	-	-	-	-	-	1
flatstem pondweed	-	-	-	-	-	-	-	-	-	-	-	-	1

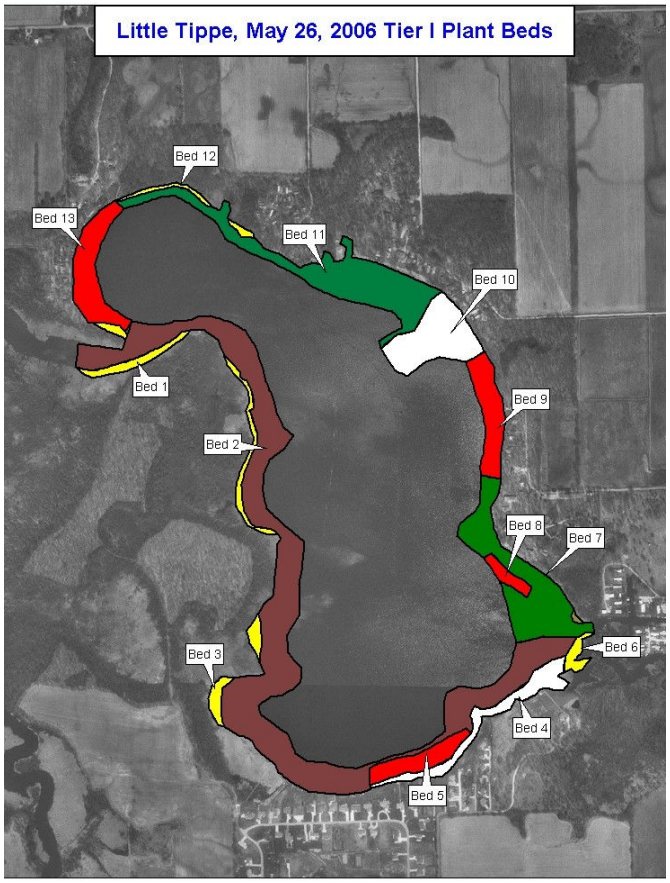

Figure 15. James Lake, Tier I survey results, May 26, 2006.

2.3.2 August Survey, James Lake

A second round of sampling was completed on James Lake on August 2 and 3rd, 2006. Tier I and Tier II surveys were completed at this time. A Secchi measurement was taken prior to sampling and found to be 4.5 feet. The Tier I survey revealed 13 different plant beds and 20 different species. Plants were growing to a maximum depth of 17 feet. The littoral zone area was estimated to be 87.2 acres. Eurasian watermilfoil was the only invasive exotic species observed and received a density rating of 3 in plant bed 6. (Table 8 and Figure 16). Curlyleaf pondweed was not observed during this survey. Eel grass and common coontail were two of the most abundant submersed species. Several rooted floating and emergent plant beds were scattered around James Lake (these beds are colored yellow in Figure 16)

Table 8. James Lake Tier I Survey Results, August 2 & 3, 2006.

Lake: Little Tippe (James)			**Number of plant beds: 13**						**Littoral zone max depth: 17'**				
Date: 8/2/06 & 8/3/06			**Number of species: 20**										
Secchi: 4.5'			**Littoral zone size: 87.2**										
Plant Bed I.D.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Plant Bed Size (acres)	**0.7**	**18.2**	**1.5**	**0.9**	**1.5**	**0.6**	**15.3**	**0.8**	**2.7**	**10.6**	**30.4**	**2.9**	**1.1**
spatterdock	4	-	3	3	1	-	-	-	4	-	-	-	4
pickeral weed	1	-	1	-	1	-	1	-	1	-	-	-	2
arrow arum	1	-	2	3	1	-	-	-	-	-	-	-	2
swamp rose mallow	1	-	2	-	2	-	-	-	1	-	-	-	1
eel grass	-	2	-	-	-	-	3	-	-	1	3	1	-
Chara	-	2	2	-	2	2		1	-		1	1	-
sago pondweed	-	1	-	-	-	-	2	-	-	1	2	-	-
Richardson's pondweed	-	1	-	-	-	-	-	-	-	-	-	-	-
common coontail	-	1	-	-	-	-	1	-	3	4	1	-	-
common cattail	-	-	2	1	3	-	-	-	3	-	-	-	2
swamp loosestrife	-	-	1	-	-	-	-	-	-	-	-	-	-
white water lily	-	-	-	-	4	-	1	1	1	-	1	-	2
Eurasian watermilfoil	-	-	-	-	-	3		-	-	-	1	-	-
slender naiad	-	-	-	-	-	-	1	-	-	-	1	-	-
variable milfoil	-	-	-	-	-	-	1	-	-	-	-	-	-
watermeal	-	-	-	-	-	-	-	-	1	-	-	-	-
leafy pondweed	-	-	-	-	-	-	-	-	-	-	1	-	-
Illinois pondweed	-	-	-	-	-	-	-	-	-	-	1	-	-
water stargrass	-	-	-	-	-	-	-	-	-	-	1	-	-
button bush	-	-	-	-	-	-	-	-	-	-	-	-	2

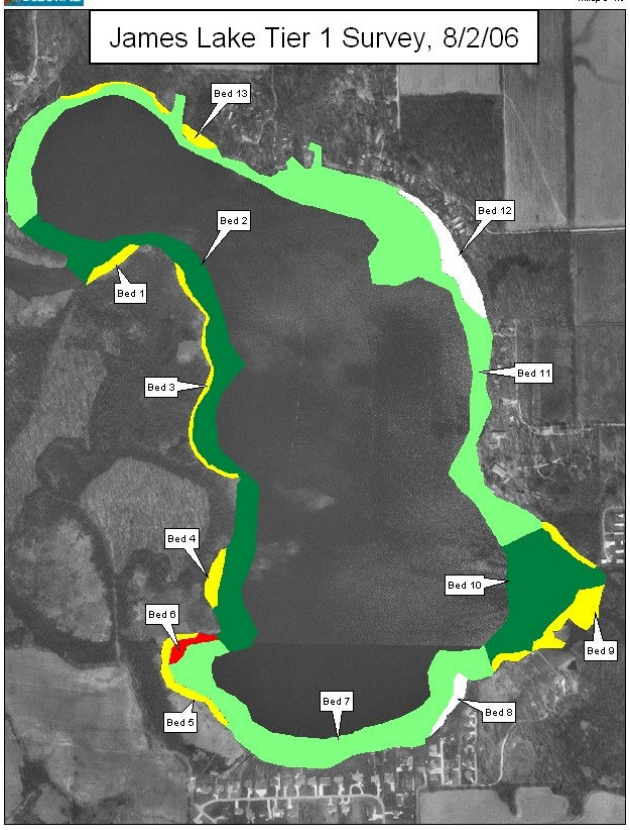

Figure 16. James Lake, Tier I plant beds, August 2 & 3, 2006.

On August 2 & 3, 2006 a Tier II survey was completed on James Lake following the Tier I survey. A total of 60 sites were sampled throughout the littoral zone (18 sample sites from 0-5ft, 16 sites 5-10ft, 16 sites 10-15 ft, and 10 sites 15-20ft). Results of the sampling are listed in Table 9. Aquatic vegetation was present at 50 of the sites. A total of 14 species were collected of which 13 were native. The maximum number of species per site was 5 while the mean species per site was 1.45. Overall species density and abundance is illustrated below in Figure 17.

Table 9. Occurrence and Abundance of Submersed Aquatic Plants In James Lake, August 2 & 3, 2006.

Occurrence and abundance of submersed aquatic plants in James Lake (little tippe)						
County:	Kosciusko	Sites with plants:	50	Mean species/site:	1.45	
Date:	8/2&3/2006	Sites with native plants:	50	Standard error (ms/s):	0.15	
Secchi (ft):	4.5	Number of species:	14	Mean native species/site:	1.43	
Maximum plant depth (ft):	16	Number of native species:	13	Standard error (mns/s):	0.15	
Trophic status	Mesotrophic	Maximum species/site:	5	Species diversity:	0.78	
Total sites:	60			Native species diversity:	0.77	

All depths (0 to 20 ft)	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
common coontail	61.7	33.0	5.0	1.7	55.0	53.0
eel grass	18.3	81.7	0.0	5.0	10.0	8.3
Chara	15.0	85.0	5.0	5.0	5.0	7.0
brittle naiad	10.0	90.0	3.3	3.3	3.3	4.0
slender naiad	8.3	91.7	3.3	1.7	3.3	1.7
American elodea	6.7	92.3	0.0	0.0	6.7	2.7
sago pondweed	6.7	92.3	0.0	1.7	5.0	1.3
flatstemmed pondweed	6.7	93.3	0.0	1.7	5.0	1.3
water stargrass	3.3	96.7	0.0	1.7	1.7	0.7
Eurasian watermilfoil	1.7	98.3	0.0	0.0	1.7	0.3
prickly coontail	1.7	98.3	0.0	0.0	1.7	0.3
Richardson's pondweed	1.7	98.3	0.0	0.0	1.7	0.3
white water buttercup	1.7	98.3	0.0	0.0	1.7	0.3
leafy pondweed	1.7	98.3	0.0	0.0	1.7	0.3

Depth: 0 to 5 ft	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
Chara	47.4	52.6	15.8	15.8	15.8	22.1
eel grass	47.4	52.6	10.5	15.8	21.1	20.0
brittle naiad	31.6	68.4	10.5	10.5	10.5	12.6
common coontail	26.3	73.7	0.0	0.0	26.3	13.7
slender naiad	26.3	73.7	10.5	5.3	10.5	5.3
sago pondweed	21.1	79.9	0.0	5.3	15.8	4.2
flatstemmed pondweed	21.1	79.9	0.0	5.3	15.8	4.2
American elodea	10.5	89.5	0.0	0.0	10.5	6.3
Eurasian watermilfoil	5.3	94.7	0.0	0.0	5.3	1.1
Richardson's pondweed	5.3	94.7	0.0	0.0	5.3	1.1
white water buttercup	5.3	94.7	0.0	0.0	5.3	1.1
water stargrass	5.3	94.7	0.0	5.3	0.0	1.1

Depth: 5 to 10 ft	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
common coontail	93.3	6.7	20.0	0.0	73.3	77.3
eel grass	6.7	3.3	0.0	0.0	6.7	4.0
leafy pondweed	6.7	3.3	0.0	0.0	6.7	1.3

Depth: 10 to 15 ft	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
common coontail	93.8	6.2	0.0	0.0	93.8	93.8
American elodea	12.5	87.5	0.0	0.0	12.5	2.5
prickly coontail	6.3	93.7	0.0	0.0	6.3	1.3
eel grass	6.3	93.7	0.0	0.0	6.3	3.8
water stargrass	6.3	93.7	0.0	0.0	6.3	1.3

Depth: 15 to 20 ft	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
common coontail	30.0	70.0	10.0	20.0	0.0	26.0

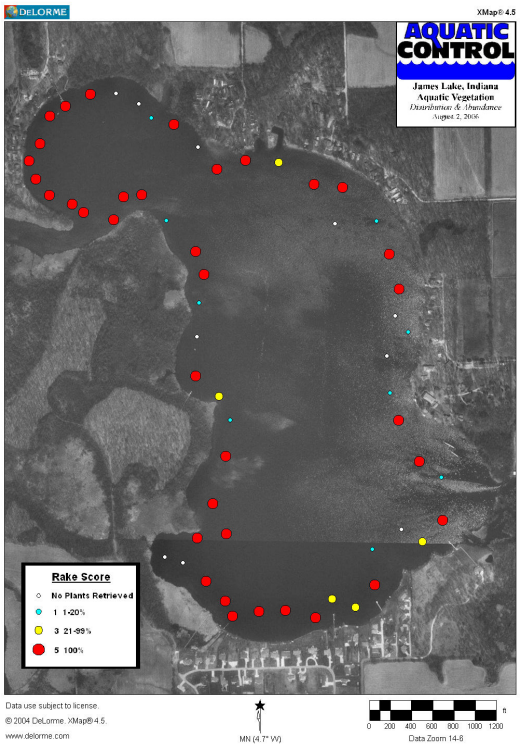

Figure 17. Overall aquatic vegetation distribution and abundance in James Lake, August 2, 2006.

Common coontail was present at the highest percentage of sample sites (61.7%) and also the highest dominance rating (Figure 18). Eel grass ranked second in site frequency (18.3%) and was most abundant in water less than 5.0 feet (Figure 19). Eurasian watermilfoil was found at a single site (Figure 20).

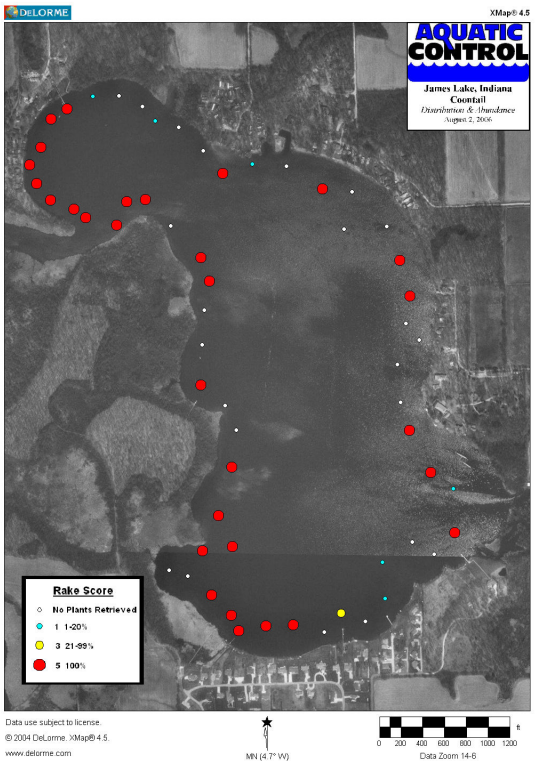

Figure 18. James Lake, coontail distribution and abundance, August 2 & 3, 2006

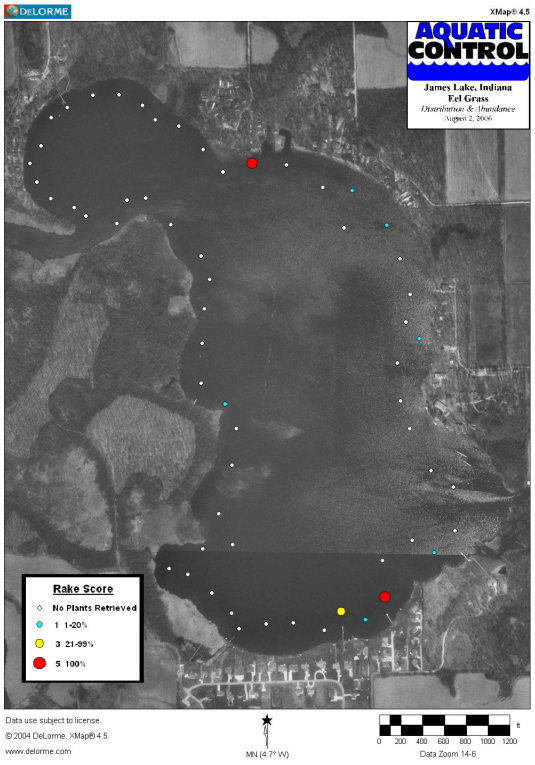

Figure 19. James Lake, eelgrass distribution and abundance, August 2 & 3, 2006

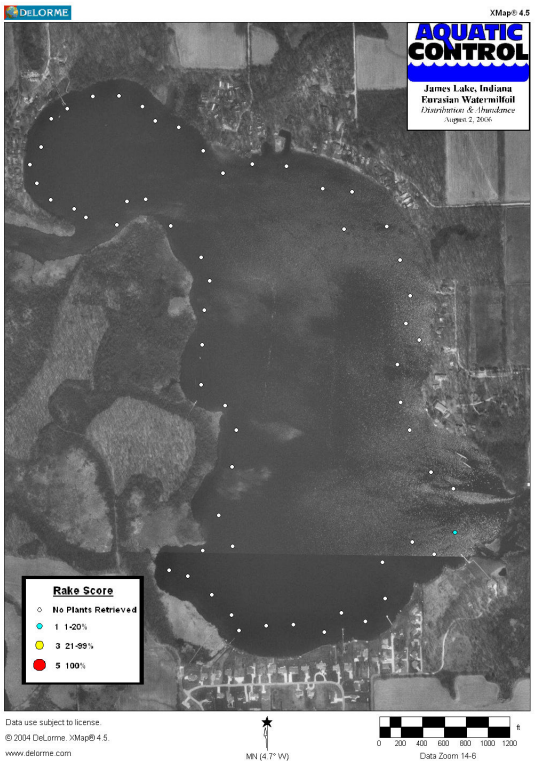

Figure 20. James Lake, Eurasian watermilfoil distribution and abundance, August 2 & 3, 2006

2.4 Plant Sampling Discussion

LTPOA membership includes residents from all three lakes in the Tippecanoe Chain. These lakes are all connected to one another, but there are many differences in water quality, average depth, and shoreline development. These difference lead to variation in plant communities, and thus the plant sampling and sampling discussion focuses on the individual lakes.

2.4.1 Lake Tippecanoe Sampling Discussion

Lake Tippecanoe is the deepest natural lake in Indiana. This fact limits the amount of nuisance vegetation growth. However, there are dense beds of vegetation growing near shore and in high-use areas. Typically, curlyleaf pondweed and Eurasian watermilfoil are the primary nuisance species in the spring and eel grass is the primary nuisance submersed species in the summer. In addition to the eel grass, mats of a bluegreen algae identified as *Lyngbya wollei* create nuisance conditions in the eastern side of Lake Tippecanoe and likely limit beneficial submersed vegetation growth (species identified by Greenwater Labs, Palatka, FL). Since 2003, the focus of LTPOA sponsored controls has been on Eurasian watermilfoil with some spot treatment on eel grass. The milfoil treatments were completed with Renovate herbicide in order to selectively control this plant while allowing native vegetation to replace the nuisance exotic species. These treatments were completed in order to meet the plant management goals of the Association, which are to reduce nuisance conditions caused primarily by exotic species, while preserving and enhancing the native plant community. The sampling results appear to show that native vegetation has been preserved even while actively controlling

nuisance exotics. This fact is illustrated in Figures 21-22, which shows an increase in native species abundance and diversity.

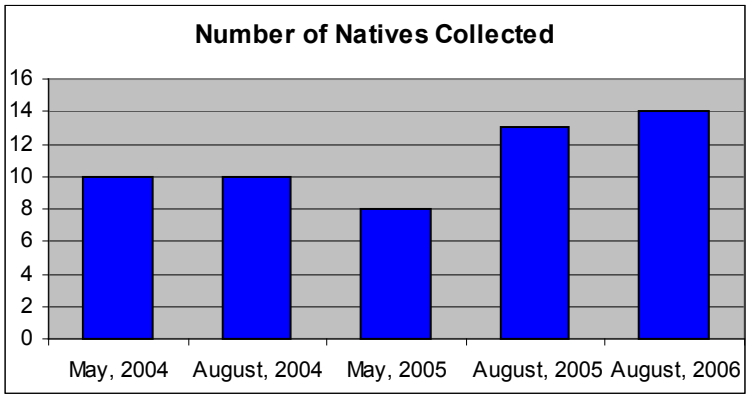

Figure 21. Lake Tippecanoe, comparison of the number of native species collected in the last five surveys.

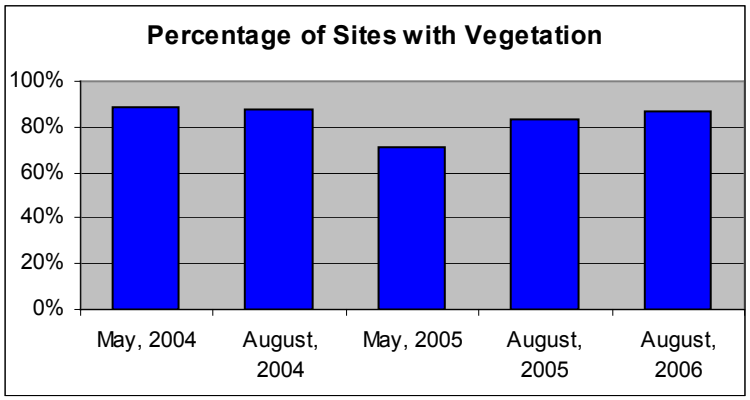

Figure 22. Lake Tippecanoe, percentage of sites with vegetation in the last five surveys.

There appears to have been a decline in Eurasian watermilfoil abundance on Lake Tippecanoe since the spring of 2004 (Figure 23). This may be a result of actively treating Eurasian watermilfoil with systemic herbicides. The reduction in Eurasian watermilfoil is likely having a positive effect on the diversity and density of native plant species. This year there was a slight increase in milfoil abundance compared to August 2005. The reason for the increase is not clear, but this species was not at a nuisance level.

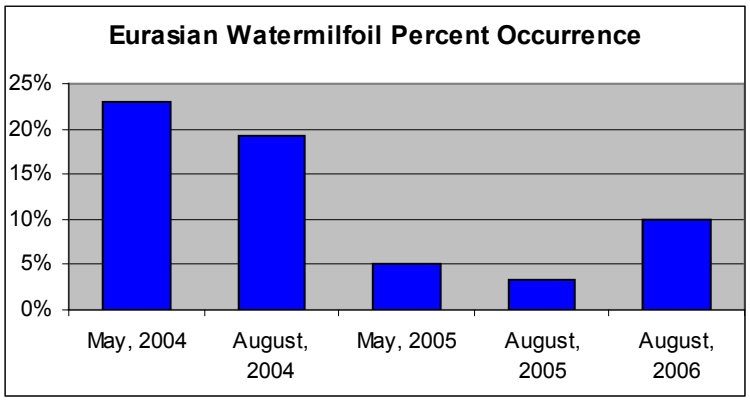

Figure 23. Lake Tippecanoe, Eurasian watermilfoil percent occurrence in the last five surveys.

Curlyleaf pondweed continues to be a nuisance species in the spring and early summer. Prior to 2006, this species had been treated in areas where it occurred along with milfoil. However, these treatments were completed too late in the season to achieve any significant long-term control (treatments have taken place in late May, by this time curlyleaf pondweed has already produced its reproductive structures). Figure 24 illustrates the trends in curlyleaf pondweed over the last three seasons. Keep in mind that curlyleaf pondweed typically decreases in abundance after July 1.

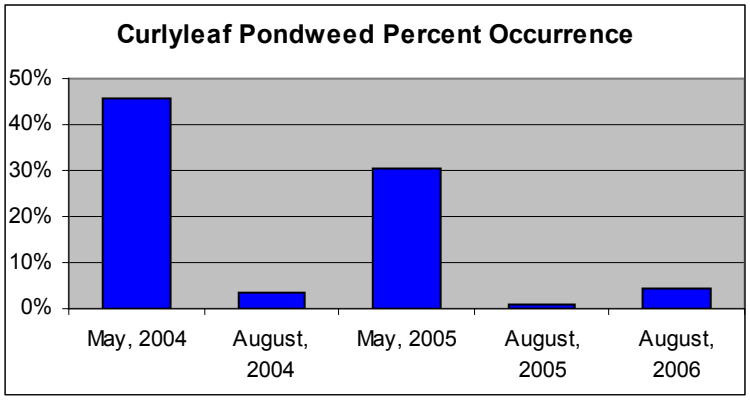

Figure 24. Lake Tippecanoe, curlyleaf pondweed percent occurrence in the last five surveys.

Eel grass continues to be dense and abundant in late summer. This species is desired by fisheries and wildlife biologist as excellent fish cover and food for waterfowl. Understandably, there are restrictions on the amount of treatment that can be completed on this species.

Lake Tippecanoe also has very little rooted floating vegetation. One of the main areas of concern is the eastern end of Lake Tippecanoe. This area is very shallow yet has little rooted vegetation in the summer months. One reason for the lack of vegetation may be intensive wave action created by pleasure boats. This wave action may not allow plants to root into the sediment. This area was also dominated by curlyleaf pondweed in the spring survey that died off in the summer and was replaced by filamentous algae.

2.4.2 Oswego Lake Sampling Discussion

Oswego Lake is a shallower than Lake Tippecanoe and thus tends to develop more nuisance conditions caused by aquatic vegetation. Eurasian watermilfoil and curlyleaf pondweed are the primary causes of these conditions. Over the last four years, Oswego Lake has received a large percentage of LTPOA sponsored selective vegetation treatments. Over the last four years, these treatments have effectively reduced nuisance conditions with little to no damage to the native plant community. Figures 25 and 26 graphically illustrate the changes in the native plant community.

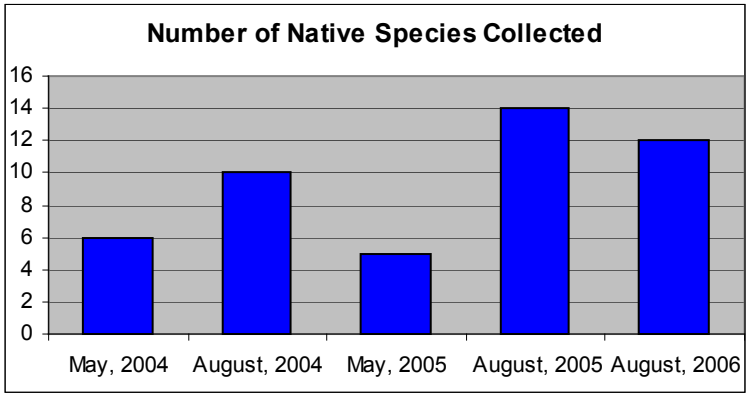

Figure 25. Oswego Lake, comparison of the number of native species collected in the last five surveys.

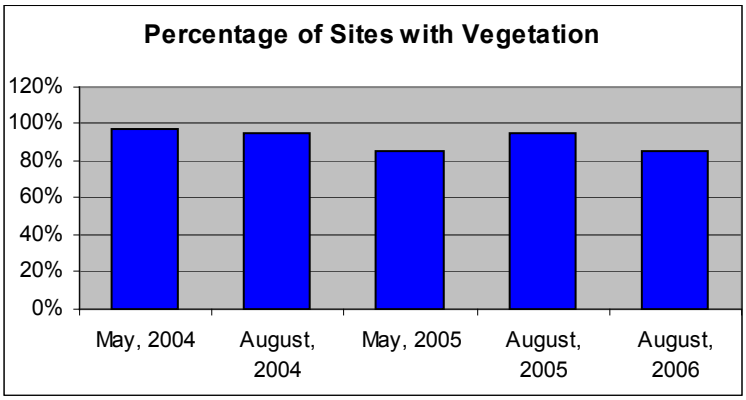

Figure 26. Oswego Lake, comparison of the percentage of sites with vegetation in the last five surveys.

There appears to have been a significant decline in Eurasian watermilfoil density and abundance on Oswego Lake since the spring of 2004 (Figure 27). This is likely the result of actively treating Eurasian watermilfoil with systemic herbicides. The reduction in Eurasian watermilfoil is likely having a positive effect on the diversity and density of native plant species.

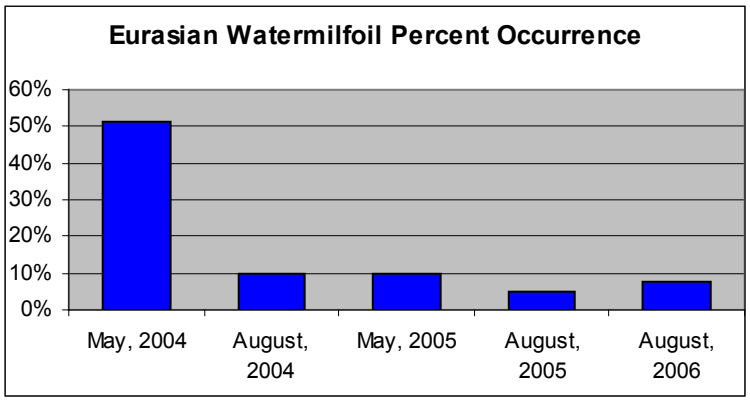

Figure 27. Oswego Lake, Eurasian watermilfoil percent occurrence in the last five surveys.

Much like on Lake Tippecanoe, curlyleaf pondweed continues to be a nuisance species in the spring and early summer on Oswego Lake. Figures 28 illustrate the trends in curlyleaf pondweed over the last three seasons. In order to get a more accurate representation of this species it would be better to use spring Tier II data which was not collected this season due to a change in the LARE sampling protocol.

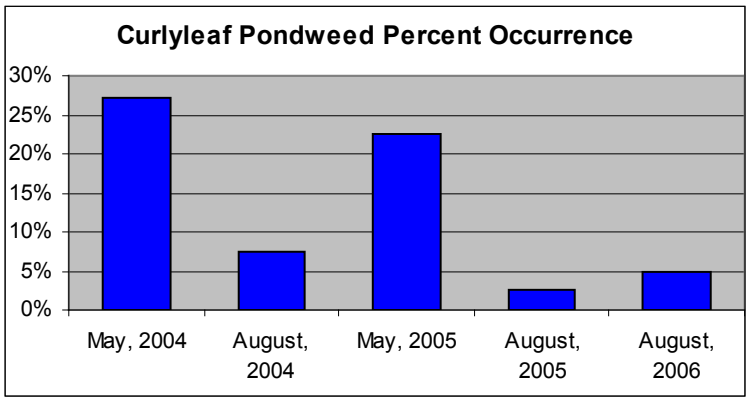

Figure 28. Oswego Lake, curlyleaf pondweed percent occurrence in the last five surveys.

2.4.3 James Lake Sampling Discussion

In 2003 and 2004, there was very little impairment on James Lake created by nuisance exotic species, to the point that no LTPOA sponsored treatments were completed (Aquatic Control only treated milfoil in the most impaired areas due to a limited LTPOA budget, James Lake had milfoil but not to the extent of the other two lakes). However, in 2005 it appeared that the lack of treatments allowed Eurasian watermilfoil to spread, and a large percentage of the lake was treated with Renovate herbicide. There appeared to be a reduction in Eurasian watermilfoil this spring, but several areas were treated again in 2006. The treatments appear to be having a positive effect on reducing Eurasian watermilfoil abundance (Figure 29).

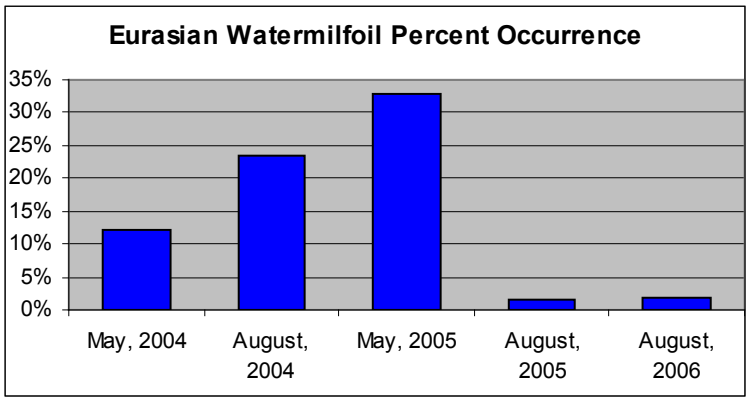

Figure 29. James Lake, Eurasian watermilfoil percent occurrence in the last five surveys.

There appeared to be no negative effect on native vegetation following spring herbicide applications. This is illustrated in Figures 30 and 31, which show little significant change in the plant community over the last five surveys.

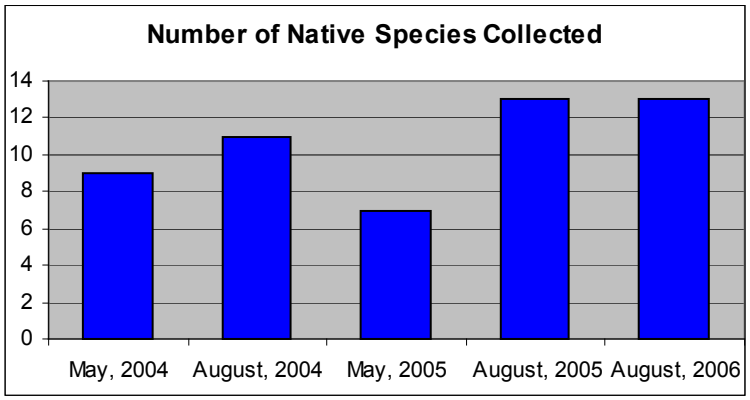

Figure 30. James Lake, number of species collected in the last five surveys.

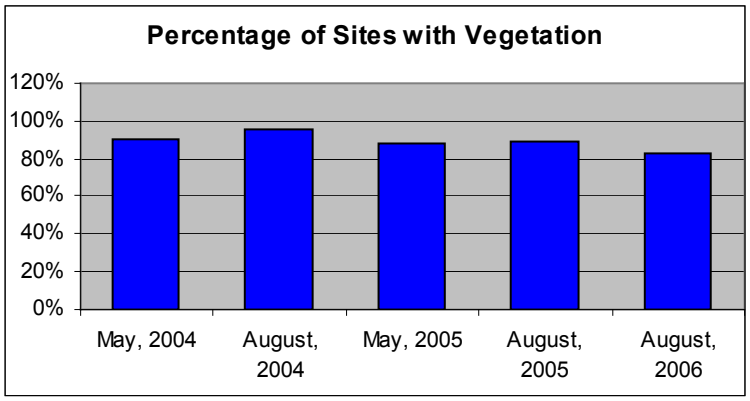

Figure 31. James Lake, percentage of sites with vegetation in the last five surveys.

3.0 2006 VEGETATION CONTROL

In general, the goal of the vegetation management plan is to control nuisance aquatic species, with a focus on exotic nuisance plants, while preserving and enhancing beneficial native vegetation. From 2003-2005, LTPOA funded treatment of Eurasian watermilfoil in main lake areas. Treatment areas were chosen by Aquatic Control plant managers following spring surveys. Only the densest areas of milfoil were treated (ideally, LTPOA would fund the treatment of all areas of milfoil, but due to a limited budget it was left up to Aquatic Control to select the most impaired areas for treatment). In 2003 and 2004 these treatments focused primarily on Oswego Lake with some scattered areas in Lake Tippecanoe. James Lake was not treated in 2003 and 2004, even though there was some milfoil present. In 2003 and 2004 it was determined that Oswego and Tippecanoe had more impaired areas. By the 2005 spring survey, it became apparent that long-term control was being achieved on Oswego and Lake Tippecanoe. There were still some small nuisance patches, but overall there was a significant reduction in Eurasian watermilfoil density and abundance. However, milfoil was rapidly spreading in James Lake where no treatments had been completed. In 2005 James Lake received the largest majority of treatment. In 2006, LTPOA received a grant from the LARE program to complete treatment of Eurasian watermilfoil. Treatment areas were mapped out during the spring Tier I survey. A total of 37 acres of Eurasian watermilfoil was treated on May 31. Oswego Lake received the most treatment (19 acres), followed by Tippecanoe (10 acres), and James (8 acres). Figure 32 illustrates the treatment areas. Renovate herbicide was used in all of the milfoil treatments.

Figure 32. Lake Tippecanoe, Eurasian watermilfoil treatment areas, May 31, 2006

LTPOA also contracted Aquatic Control to complete treatment of nuisance areas of eel grass in late summer. In July, LTPOA representatives and Aquatic Control plant managers visually inspected traditionally nuisance eel grass areas. It was determined that only two areas totaling 7.5 acres had levels of eel grass that were inhibiting boat access. Treatment was completed on these areas on August 3, 2006. These areas were located in the southeast section of Lake Tippecanoe (Figure 33). The treatment areas were inspected two weeks after treatment and it was determined that control was not satisfactory in the 3.5 acre area so it was retreated. The second treatment was completed on August 17. Chelated copper products were used in both treatments.

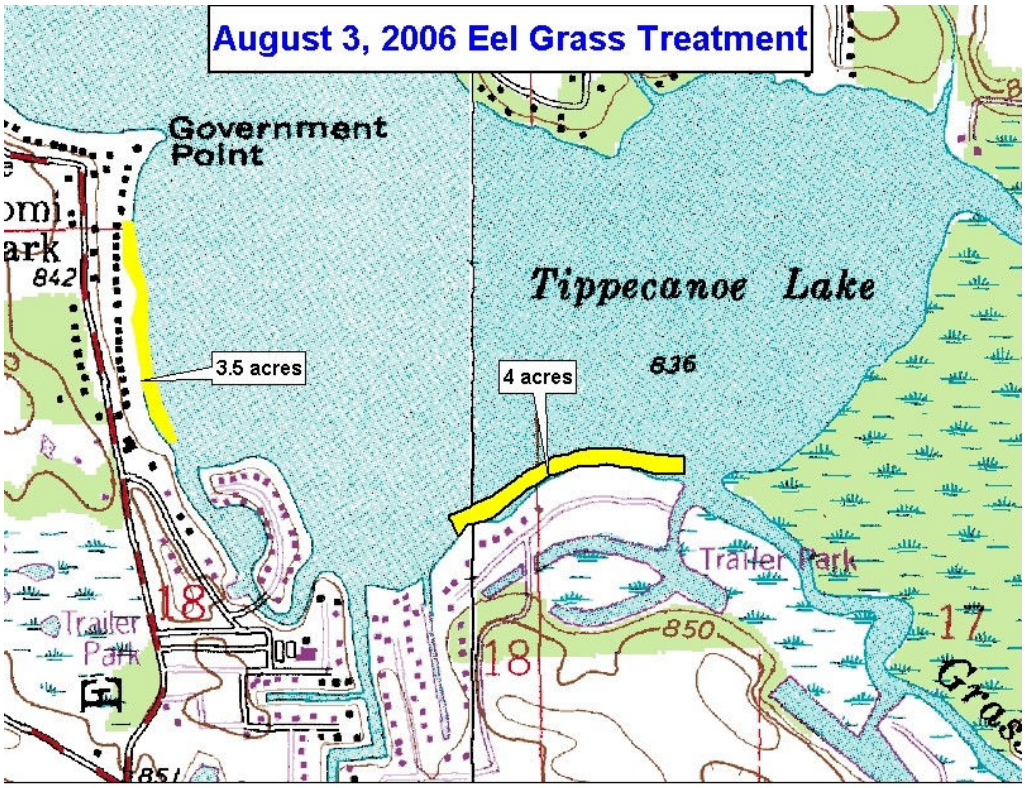

Figure 33. Lake Tippecanoe Chain, eel grass treatment areas, August 3, 2006.

In addition to LTPOA and LARE funded treatments, individual lot owners or small channel associations hire applicators to complete shoreline treatments in order to reduce nuisance conditions caused by aquatic plants. It appears that 43.6 acres of channels and lots were permitted for treatment in 2006. Contact herbicides were the primary tool used in these treatments.

4.0 ACTION PLAN AND BUDGET UPDATE

The 2005 vegetation management plan recommended treatment of 37 acres of Eurasian watermilfoil and 84 acres of curlyleaf pondweed in the three lakes. LARE only funded treatment of Eurasian watermilfoil, so no treatment of curlyleaf pondweed was completed in 2006. It appears that curlyleaf pondweed is taking the place of Eurasian watermilfoil in many areas where long-term milfoil control has occurred. It is estimated that up to 104 acres of curlyleaf pondweed may require treatment next season (includes large area in

eastern end of Lake Tippecanoe which wasn't included in 2005). In order to control this species, early season treatments should be completed to eliminate curlyleaf pondweed before it produces reproductive structures. These treatments should be completed in April, or when the water reaches 50 degrees. Low doses of Aquathol K have proven effective at controlling curlyleaf pondweed (see Page 50 of the original plan for further discussion of this type of treatment). Based on spring sampling results and visual surveys, it is estimated that up to 104 acres of curlyleaf pondweed will require treatment on the Tippecanoe Chain (64 acres on Lake Tippecanoe, 28 acres on James, and 12 acres on Oswego). Figure 34 is an estimate of areas that may require treatment next season. This treatment should be completed for three to four consecutive seasons in order to reduce curlyleaf pondweed to a level that can be easily managed exclusively by the Association. Treatment areas should be mapped out with an early spring visual survey using GPS and a GIS mapping system. An early spring Tier II survey should also be completed in order to document the long-term effects of the treatment.

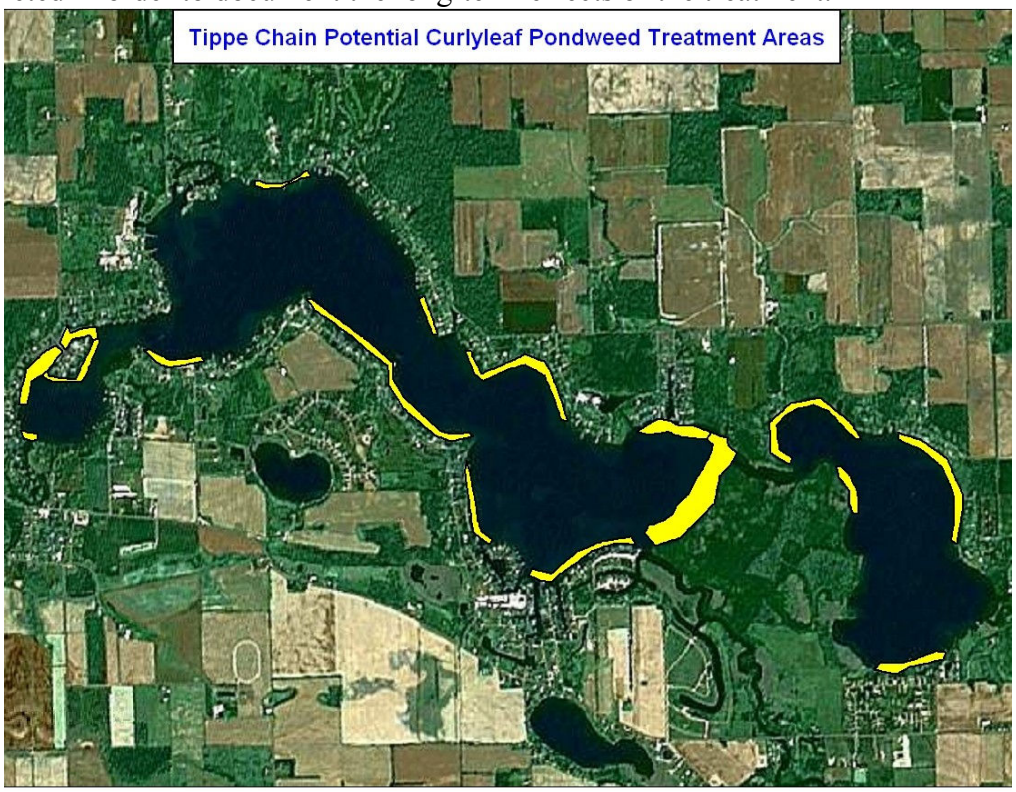

Figure 34. Tippecanoe Chain, potential curlyleaf pondweed treatment areas.

From 2003-2005 LTPOA took on the responsibility of reducing the negative impacts caused by Eurasian watermilfoil. In 2006, LARE funded treatment of 37 acres of Eurasian watermilfoil (summarized in Table 10). Sampling results indicate that long-term control of this species is being achieved. There has been a steady decline in Eurasian watermilfoil since the inception of the treatment program in 2003. However, this species should continue to be managed in order to keep it from returning to pre-2003 levels.

Table 10. Selective invasive species treatments completed on Lake Tippecanoe since 2003.

Year	Species Targeted	Lakes Treated	Acres Treated
2003	Eurasian watermilfoil and curlyleaf pondweed	Tippe and Oswego	35
2004	Eurasian watermilfoil and curlyleaf pondweed	Tippe and Oswego	32
2005	Eurasian watermilfoil and curlyleaf pondweed	Tippe, Oswego, and James	21.5
2006	Eurasian watermilfoil	Tippe, Oswego, and James	37

Some milfoil will return in 2007. Eurasian watermilfoil should be treated anywhere it occurs within the chain of lakes. Figure 35 is an educated guess as to where this species may occur in 2007. This figure was created by reviewing past sampling data and visual surveys. It is estimated that up to 34 acres may require treatment on the Tippecanoe Chain in 2007 (13 acres on Lake Tippecanoe, 7 acres on James, and 14 acres on Oswego). Actual treatment areas should be determined following a visual survey that should be completed in the spring. The liquid form of Renovate should be used to treat areas larger than 5 acres with a average depth of less than 5 feet. Either Renovate granular or granular 2,4-D should be used in areas less than 5 acres or with an average depth of over 5 feet.

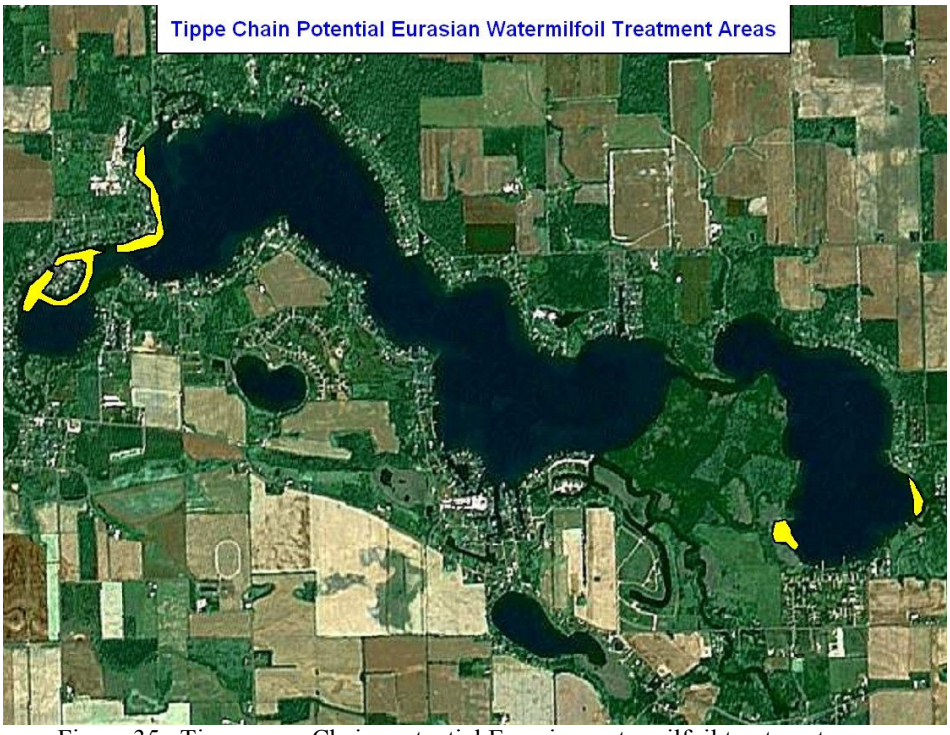

Figure 35. Tippecanoe Chain, potential Eurasian watermilfoil treatment areas.

Eel grass is a beneficial native species that typically reaches its maximum density in late summer. This species has created some nuisance conditions in the three lakes. Since 2004, LTPOA has treated some of the most impaired areas. These areas were only treated after inspections that determined that eel grass was severely impacting lake use. Traditional treatment areas can be treated without inspection, but if LTPOA wishes to expand out of these areas additional inspections will be required. This treatment will not be eligible for funding by the LARE program. It is estimated that between 5-15 acres may be eligible for treatment next season.

A portion of the LARE grant funds were allocated to an Eco-zone feasibility study. Williams Creek Consulting was hired to complete the study. When this plan was written the Eco-zone proposal was still under development. Information from the final proposal will be included in the 2007 update.

Listed below in Table 11 is a budget estimate for vegetation controls over the next four seasons. The potential LARE funded items include the curlyleaf pondweed treatment, Eurasian watermilfoil treatment, and continued vegetation sampling (early spring Tier II survey and treatment map and summer Tier II survey). LTPOA should request $54,250 from the LARE program. LARE did not have enough funds for treatment of curlyleaf pondweed last season, and this may be the case again in 2007. If LTPOA wishes to complete the early season curlyleaf treatment then they will have to come up with approximately $33,800. The estimated budget has increased compared to past budgets due to the increase in curlyleaf pondweed abundance. Treatment of eel grass will not be funded by LARE.

Table 11. Four year budget estimate for plant management on the Tippecanoe Chain.

	2007	2008	2009	2010
Curlyleaf pondweed treatment:	$33,800	$33,800	$33,800	$33,800
Eurasian watermilfoil treatment:	$14,450	$12,750	$8,500	$4,250
Eel grass treatment:	$4,000	$4,000	$4,000	$4,000
Plant sampling and plan update:	$6,000	$6,000	$6,000	$6,000
Total potentially funded by LARE:	**$54,250**	**$52,550**	**$48,300**	**$44,050**
Total funded by LTPOA if full grant is awarded (does not include 10% match):	**$4,000**	**$4,000**	**$4,000**	**$4,000**

5.0 PUBLIC INVOLVEMENT

A public meeting was held September 13, 2006 at the North Webster Community Center. This meeting was designed to gain further input from lake users; to educate lake users of the 2006 vegetation management activities, and to inform users of potential vegetation management plan updates. Approximately thirty-four individuals were in attendance and twenty of those individuals filled out a lake user survey form. All survey participants were lake property owners of which 95% lived on Lake Tippecanoe and 5% lived on James. Eighty-five percent of survey participants have lived on the lakes for more than 10 years. Ninety-five percent of those surveyed used the lake for boating and swimming,

while 70% also used the lake for fishing, and 20% for irrigation. Survey respondents indicated that 30% believed poor water quality was a problem, 55% too many jet skis, 35% sedimentation, 10% not enough aquatic plants, 15% overuse by non-residents, 45% believed pier funneling was a problem, and 95% believed nuisance plants were a problem. All of those that filled out the survey were in favor of continued vegetation control.

Another topic discussed at the public meeting was the recent discovery of hydrilla (*Hydrilla verticillata*) in Lake Manitou. Hydrilla is an invasive aquatic species that was originally discovered in Florida in the 1960's. There are many characteristics of hydrilla that make it a threat to Indiana waterways. This species can grow in lower light conditions than most native species, grows faster than most native species, and can shade out other species by forming a surface canopy. Hydrilla can be easily confused with native elodea. The best way to distinguish hydrilla from native elodea is that hydrilla typically has five leaves along each whorl along with visible serrated edges along the leaf margin (Figure 36). What makes controlling the spread of hydrilla difficult is the fact that it can be spread by fragments. **That is why it is vitally important that lake users remove all plants and sediment from their boats when entering and leaving the Tippecanoe Lakes.** More information about controlling the spread of hydrilla can be found at www.protectyourwaters.net.

Figure 36. Illustration of hydrilla on the left compared to native elodea on the right. Hydrilla typically contains five toothed leaves per whorl while native elodea typically has three leaves per whorl and the teeth are not visible on the leaves (Illustrations provided by Applied Biochemist).

It will be important for the Association to continue to inform users of proper land management practices that have minimal negative impacts on the lakes water quality.

This may include discouraging fertilizer use, not disposing of yard waste in or near the lake, and allowing natural vegetation to grow along the shoreline as opposed to concrete seawalls. Residents should also continue to be informed of the benefits of native vegetation on fish populations and water quality. These items can be reinforced in Association newsletters, websites, and at Association meetings.

6.0 APPENDIX UPDATE

6.1 2006 Sampling Data

Lake Tippecanoe Tier II Data

Plant Database

Lake	Date	Latitude	Longitude	Design	Site	Depth	RAKE	MYSP2	POCR3	CEDE4	CH?AR	CEEC	NAFL	POPE6	VAAM3	ELCA7	POZO	PORI2	POGR8	MYSI	MYHE	MYVE	ZODU
Tippecanoe	8/2/06	41.3282	-85.777431		181	11.0	5			3					5			1		1			
Tippecanoe	8/2/06	41.32871	-85.775322		182	16.0	5	1		5													
Tippecanoe	8/2/06	41.32964	-85.773605		183	5.0	1				1												
Tippecanoe	8/2/06	41.3309	-85.771664		184	12.0	3			3					1								
Tippecanoe	8/2/06	41.33147	-85.769914		185	4.0	5		1						5								
Tippecanoe	8/2/06	41.3309	-85.768256		186	11.0	5			3					3			3					3
Tippecanoe	8/2/06	41.33022	-85.766825		187	8.0	5								5								
Tippecanoe	8/2/06	41.32927	-85.765498		188	10.0	5								5		1						1
Tippecanoe	8/2/06	41.32861	-85.764031		189	12.0	1								1								
Tippecanoe	8/2/06	41.32814	-85.762773		190	6.0	5			1					5								5
Tippecanoe	8/2/06	41.32705	-85.762321		191	11.0	5								5					1			
Tippecanoe	8/2/06	41.32612	-85.76214		192	4.0	5				5				1								
Tippecanoe	8/2/06	41.32578	-85.761345		193	12.0	5			5					1								
Tippecanoe	8/2/06	41.32494	-85.760697		194	4.0	3				1		1		3								
Tippecanoe	8/2/06	41.32492	-85.759228		195	10.0	5			3					3						1		
Tippecanoe	8/2/06	41.32423	-85.758057		196	4.0	3				1				3								
Tippecanoe	8/2/06	41.32436	-85.756407		197	13.0	0																
Tippecanoe	8/2/06	41.32336	-85.756982		198	5.0	5				3				3			1					1
Tippecanoe	8/2/06	41.32254	-85.756801		199	18.0	3			3													
Tippecanoe	8/2/06	41.32156	-85.757022		200	5.0	5				1				5		1		1				1
Tippecanoe	8/2/06	41.32045	-85.756391		201	7.0	3			1				1	3								
Tippecanoe	8/2/06	41.31967	-85.755803		202	17.0	1			1													
Tippecanoe	8/2/06	41.31883	-85.755404		203	4.0	1				1		1										
Tippecanoe	8/2/06	41.31915	-85.753859		204	6.0	3	1		1					3								
Tippecanoe	8/2/06	41.31819	-85.753599		205	6.0	5			1					5			1		1			1
Tippecanoe	8/2/06	41.31709	-85.753037		206	6.0	1								1								
Tippecanoe	8/2/06	41.31646	-85.751712		207	3.0	3				3				1								
Tippecanoe	8/2/06	41.3181	-85.750765		208	15.0	5			5								1					
Tippecanoe	8/2/06	41.318	-85.748948		209	3.0	5				5				1			1					
Tippecanoe	8/2/06	41.31932	-85.748181		210	5.0	0																
Tippecanoe	8/2/06	41.31961	-85.746716		211	7.0	0																
Tippecanoe	8/2/06	41.31874	-85.745822		212	3.0	1									1							
Tippecanoe	8/2/06	41.31902	-85.743988		213	3.0	0																
Tippecanoe	8/2/06	41.3202	-85.744685		214	16.0	5			5													
Tippecanoe	8/2/06	41.32065	-85.742727		215	6.0	0																
Tippecanoe	8/2/06	41.32185	-85.740786		216	4.0	1		1														
Tippecanoe	8/2/06	41.32317	-85.74061		217	5.0	1			1													
Tippecanoe	8/2/06	41.32392	-85.742285		218	5.0	0																
Tippecanoe	8/2/06	41.32299	-85.743691		219	12.0	5			5													
Tippecanoe	8/2/06	41.3235	-85.745302		220	11.0	0																
Tippecanoe	8/2/06	41.32323	-85.746704		221	6.0	5								5								
Tippecanoe	8/2/06	41.32274	-85.747984		222	11.0	5			5				1	1								
Tippecanoe	8/2/06	41.3234	-85.74928		223	16.0	3			3													
Tippecanoe	8/2/06	41.32406	-85.750354		224	4.0	5								5								
Tippecanoe	8/2/06	41.32468	-85.751587		225	6.0	5			1					5			1					1
Tippecanoe	8/2/06	41.32635	-85.752094		226	6.0	5								5								1
Tippecanoe	8/2/06	41.32741	-85.753172		227	11.0	5			1					5			1					
Tippecanoe	8/2/06	41.32725	-85.754867		228	17.0	1			1													
Tippecanoe	8/2/06	41.32689	-85.756155		229	12.0	1			1					1								
Tippecanoe	8/2/06	41.32752	-85.757309		230	5.0	3								3								
Tippecanoe	8/2/06	41.32849	-85.75848		231	9.0	5			1					5								1
Tippecanoe	8/2/06	41.32907	-85.759699		232	19.0	0																
Tippecanoe	8/2/06	41.33014	-85.760535		233	6.0	5						1		5		1						
Tippecanoe	8/2/06	41.33141	-85.761159		234	12.0	1								1								
Tippecanoe	8/2/06	41.33273	-85.761634		235	18.0	5			5													
Tippecanoe	8/2/06	41.33384	-85.762297		236	13.0	3					1					1						3
Tippecanoe	8/2/06	41.33509	-85.76355		237	5.0	3				1				1				1				
Tippecanoe	8/2/06	41.33605	-85.764806		238	7.0	5			1					3			5					
Tippecanoe	8/2/06	41.33698	-85.765942		239	13.0	5					5											
Tippecanoe	8/2/06	41.33777	-85.767387		240	5.0	5				1				5								
Tippecanoe	8/2/06	41.33783	-85.768485		241	5.0	3				1				3								
Tippecanoe	8/2/06	41.33716	-85.76911		242	11.0	5	1		5				1									
Tippecanoe	8/2/06	41.33697	-85.770222		243	11.0	0																
Tippecanoe	8/2/06	41.33658	-85.770951		244	5.0	5				1			1	1		1			3			
Tippecanoe	8/2/06	41.33691	-85.77221		245	7.0	3			1					3							1	
Tippecanoe	8/2/06	41.33731	-85.773449		246	4.0	5				5				1								
Tippecanoe	8/2/06	41.33673	-85.773796		247	13.0	3	1		1		3			1								
Tippecanoe	8/2/06	41.33642	-85.775075		248	4.0	1				1												
Tippecanoe	8/2/06	41.33581	-85.774817		249	16.0	5					5											
Tippecanoe	8/2/06	41.33551	-85.775789		250	17.0	1			1													
Tippecanoe	8/2/06	41.33545	-85.776939		251	8.0	0																
Tippecanoe	8/2/06	41.33601	-85.778217		252	4.0	3				1				3								
Tippecanoe	8/2/06	41.33533	-85.779154		253	6.0	3				3												
Tippecanoe	8/2/06	41.33469	-85.77832		254	15.0	5			5		1											
Tippecanoe	8/2/06	41.33412	-85.779603		255	6.0	5				4				3	1							
Tippecanoe	8/2/06	41.33372	-85.778437		256	12.0	5	1		5													
Tippecanoe	8/2/06	41.33274	-85.778804		257	4.0	5	1			4			1	1								
Tippecanoe	8/2/06	41.33214	-85.778065		258	15.0	5			1		5											
Tippecanoe	8/2/06	41.33144	-85.77817		259	4.0	5				4				1								
Tippecanoe	8/2/06	41.33069	-85.77821		260	7.0	1								1								
Tippecanoe	8/2/06	41.32984	-85.77831		261	12.0	5	5															
Tippecanoe	8/2/06	41.33027	-85.779611		262	6.0	5								5								
Tippecanoe	8/2/06	41.32979	-85.780509		263	13.0	3	1	3														
Tippecanoe	8/2/06	41.32863	-85.780055		264	6.0	5	1							1								
Tippecanoe	8/2/06	41.32817	-85.77668		265	8.0	5								5								
Tippecanoe	8/2/06	41.3283	-85.776432		266	4.0	5		3		3					1							
Tippecanoe	8/2/06	41.32859	-85.773884		267	4.0	5				5				1								
Tippecanoe	8/2/06	41.33016	-85.772536		268	3.0	0																
Tippecanoe	8/2/06	41.33076	-85.770773		269	3.0	0																
Tippecanoe	8/2/06	41.33171	-85.769037		270	4.0	5				1		5										

Oswego Lake Tier II Data

Lake	Date	Latitude	Longitude	Design	Site	Depth	RAKE	MYSP2	POCR3	CEDE4	CH?AR	NAFL	POPE6	VAAM3	ELCA7	POZO	PORI2	POGR8	MYHE	NAMA	POIL
Oswego	8/2/06	41.32978	-85.782915		141	5.0	5			1	1			5							
Oswego	8/2/06	41.32965	-85.783899		142	7.0	5				5			1							
Oswego	8/2/06	41.32941	-85.785196		143	6.0	5			1	5			1							
Oswego	8/2/06	41.32909	-85.78401		144	4.0	5				5			1							
Oswego	8/2/06	41.32843	-85.783947		145	4.0	5				1			5			1				
Oswego	8/2/06	41.32777	-85.784631		146	7.0	5			5				1	1						
Oswego	8/2/06	41.32708	-85.784789		147	5.0	3		1					3		1					
Oswego	8/2/06	41.32665	-85.784664		148	5.0	1					1		1							
Oswego	8/2/06	41.32624	-85.784699		149	17.0	3			3											
Oswego	8/2/06	41.32691	-85.785582		150	6.0	3	1		3		1	1								
Oswego	8/2/06	41.32641	-85.785756		151	18.0	1			1											
Oswego	8/2/06	41.32637	-85.786368		152	11.0	1				1			1							
Oswego	8/2/06	41.32631	-85.786356		153	17.0	0														
Oswego	8/2/06	41.32624	-85.787014		154	12.0	3	1				1						3			
Oswego	8/2/06	41.32627	-85.787475		155	18.0	0														
Oswego	8/2/06	41.32699	-85.787461		156	5.0	0														
Oswego	8/2/06	41.32791	-85.787409		157	6.0	3			3				1							
Oswego	8/2/06	41.3264	-85.788236		158	8.0	3				3			1							1
Oswego	8/2/06	41.32613	-85.787942		159	19.0	1			1											
Oswego	8/2/06	41.32584	-85.788232		160	12.0	3							3							
Oswego	8/2/06	41.32545	-85.788554		161	13.0	5		1	5											
Oswego	8/2/06	41.32506	-85.788471		162	19.0	0														
Oswego	8/2/06	41.32464	-85.788667		163	11.0	5			5				1	1						
Oswego	8/2/06	41.32401	-85.788714		164	4.0	5			3				1				3			
Oswego	8/2/06	41.32437	-85.787952		165	15.0	1							1							
Oswego	8/2/06	41.3243	-85.78712		166	20.0	0														
Oswego	8/2/06	41.32395	-85.786198		167	13.0	5			5											
Oswego	8/2/06	41.32401	-85.785377		168	11.0	1					1		1					1		
Oswego	8/2/06	41.32437	-85.784686		169	11.0	5			5				1							
Oswego	8/2/06	41.32502	-85.784228		170	16.0	1			1							1				
Oswego	8/2/06	41.32539	-85.783582		171	5.0	0				1			5						1	
Oswego	8/2/06	41.32571	-85.784274		172	18.0	1			1											
Oswego	8/2/06	41.32605	-85.784891		173	20.0	1			1											
Oswego	8/2/06	41.32625	-85.785211		174	12.0	3			3											
Oswego	8/2/06	41.32612	-85.78382		175	6.0	1							1							
Oswego	8/2/06	41.32453	-85.784173		176	6.0	5				5			1				1			
Oswego	8/2/06	41.324	-85.787066		177	10.0	3	1		1				3							
Oswego	8/2/06	41.32411	-85.788063		178	6.0	3				3	1					1				
Oswego	8/2/06	41.32762	-85.783909		179	4.0	5				5										
Oswego	8/2/06	41.32857	-85.783051		180	3.0	5				1		5	1							

James Lake Tier II Data

Plant Database

Lake	Date	Latitude	Longitude	Design	Site	Depth	RAKE	MYSP2	CEDE4	CH?AR	NAFL	POPE6	VAAM3	ELCA7	CEEC	RALO	POZO	PORI2	POFO3	ZODU	NAGR
James	8/2/06	41.32233	-85.733135		271	7.0	5		5												
James	8/2/06	41.32298	-85.732155		272	7.0	5		5												
James	8/2/06	41.3223	-85.731323		273	3.0	1			1											
James	8/2/06	41.32151	-85.730298		274	11.0	5		5												
James	8/2/06	41.32092	-85.730016		275	13.0	5		5					1							
James	8/2/06	41.32018	-85.730186		276	3.0	1			1											1
James	8/2/06	41.3193	-85.730257		277	20.0	0														
James	8/2/06	41.3183	-85.730305		278	11.0	5		5												
James	8/2/06	41.31778	-85.729503		279	2.0	3						1								3
James	8/2/06	41.31716	-85.729125		280	4.0	1				1										
James	8/2/06	41.31623	-85.72927		281	6.0	5		5												
James	8/2/06	41.31501	-85.729715		282	13.0	5		5												
James	8/2/06	41.31423	-85.729243		283	16.0	5		5												
James	8/2/06	41.31412	-85.73025		284	6.0	5		5												
James	8/2/06	41.31363	-85.731376		285	2.0	0														
James	8/2/06	41.31348	-85.730753		286	18.0	0														
James	8/2/06	41.31301	-85.729947		287	8.0	5		5												
James	8/2/06	41.31249	-85.729281		288	13.0	5		5												
James	8/2/06	41.31211	-85.729032		289	7.0	5		5				3						1		
James	8/2/06	41.31222	-85.728127		290	11.0	5		5												
James	8/2/06	41.31225	-85.727204		291	9.0	5		5												
James	8/2/06	41.31207	-85.726177		292	3.0	5			3	1	1					1				5
James	8/2/06	41.31255	-85.725604		293	16.0	3		3												
James	8/2/06	41.31233	-85.724789		294	3.0	3			1			1							1	
James	8/2/06	41.31291	-85.724127		295	5.0	5		1				5				1				
James	8/2/06	41.31383	-85.724225		296	6.0	1		1												
James	8/2/06	41.31433	-85.723216		297	20.0	0														
James	8/2/06	41.31403	-85.722491		298	4.0	3			1	1	1	1				1				
James	8/2/06	41.31458	-85.721796		299	5.0	5	1	5					1							
James	8/2/06	41.31567	-85.721836		300	6.0	1		1												
James	8/2/06	41.31609	-85.722587		301	16.0	5		5												
James	8/2/06	41.31715	-85.723301		302	15.0	5		5												
James	8/2/06	41.31786	-85.723613		303	4.0	1														1
James	8/2/06	41.31881	-85.72372		304	20.0	0														
James	8/2/06	41.31942	-85.722986		305	4.0	1				1		1								
James	8/2/06	41.31985	-85.723424		306	20.0	0														
James	8/2/06	41.32054	-85.723288		307	12.0	5		5												
James	8/2/06	41.32144	-85.723627		308	14.0	5		5												
James	8/2/06	41.32228	-85.724072		309	4.0	1			1			1								
James	8/2/06	41.32222	-85.725501		310	6.0	0														
James	8/2/06	41.32317	-85.725248		311	4.0	5			5			1								
James	8/2/06	41.32324	-85.726217		312	11.0	5		5												
James	8/2/06	41.3238	-85.727433		313	4.0	3			3											1
James	8/2/06	41.32386	-85.728576		314	4.0	5		1				5				1				
James	8/2/06	41.32363	-85.729573		315	9.0	5		5												
James	8/2/06	41.3242	-85.730225		316	19.0	0														
James	8/2/06	41.32479	-85.731044		317	3.0	5			5		1									1
James	8/2/06	41.32494	-85.731848		318	6.0	1		1												
James	8/2/06	41.32531	-85.732276		319	20.0	0														
James	8/2/06	41.32557	-85.733056		320	15.0	0														
James	8/2/06	41.32557	-85.733927		321	3.0	5		1					5		1		1			
James	8/2/06	41.32526	-85.734786		322	11.0	5		5					1							
James	8/2/06	41.32501	-85.735329		323	11.0	5		5				3							1	
James	8/2/06	41.32429	-85.735676		324	15.0	5		5						1						
James	8/2/06	41.32384	-85.736047		325	3.0	5		5		1	1	3								
James	8/2/06	41.32337	-85.735817		326	8.0	5		5												
James	8/2/06	41.32296	-85.73535		327	7.0	5		5												
James	8/2/06	41.32273	-85.734554		328	10.0	5		5												
James	8/2/06	41.32252	-85.73417		329	15.0	5		5												
James	8/2/06	41.32291	-85.732784		330	13.0	5		5												

6.2 2007 Vegetation Control Permits

2007 Lake Tippecanoe Vegetation Control Permit Application

APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT
State Form 26727 (R / 11-03)
Approved State Board of Accounts 1987
☐ Whole Lake ☒ Multiple Treatment Areas
Check type of permit

INSTRUCTIONS: Please print or type information

FOR OFFICE USE ONLY
License No.
Date Issued
Lake County

Return to: Page 1 of 6
DEPARTMENT OF NATURAL RESOURCES
Division of Fish and Wildlife
Commercial License Clerk
402 West Washington Street, Room W273
Indianapolis, IN 46204

FEE: $5.00

Applicant's Name	Lake Assoc. Name	
Lake Tippecanoe POA	Lake Tippecanoe POA	
Rural Route or Street		Phone Number
67 EMS T49A		812-497-2410
City and State		ZIP Code
Syracuse, IN		46567
Certified Applicator (if applicable)	Company or Inc. Name	Certification Number
Rural Route or Street		Phone Number
City and State		ZIP Code

Lake (One application per lake)	Nearest Town	County
Lake Tippecanoe	North Webster	Kosciusko
Does water flow into a water supply		☐ Yes ☒ No

Please complete one section for *EACH* treatment area. Attach lake map showing treatment area and denote location of any water supply intake.

Treatment Area #	1	LAT/LONG or UTM's	Treatment of EWM and CLP where they occur (no more than 70 acres, see avmp)
Total acres to be controlled	<70	Proposed shoreline treatment length (ft)	Perpendicular distance from shoreline (ft)
Maximum Depth of Treatment (ft)	18	Expected date(s) of treatment(s)	Early Spring Depending on Water Temp.

Treatment method: ☒ Chemical ☐ Physical ☐ Biological Control ☐ Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Renovate or 2,4-D for EWM control and low dose Aquathol for selective CLP control (see avmp)

Plant survey method: ☒ Rake ☐ Visual ☐ Other (specify) Survey Data from 2006 May Tier I (2006 avmp update)

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Curlyleaf Pondweed	X	40
Flatstem Pondweed		5
Chara		10
Coontail		10
Largeleaf pondweed		2
Eurasian Watermilfoil	X	10
Richardson's Pondweed		10
Eel Grass		2
White Water lily		2
Elodea		2
Variable pondweed		2
Sago Pondweed		3
Spatterdock		2

Page 2 of 6

Treatment Area #	2	LAT/LONG or UTM's	Center of bed @ N41.32835 W85.77511		
Total acres to be controlled	1.86	Proposed shoreline treatment length (ft)	996	Perpendicular distance from shoreline (ft)	50
Maximum Depth of Treatment (ft)	6	Expected date(s) of treatment(s)	mid to late summer depending on plant growth		

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique and Hydrothol herbicide will be used for control of eel grass in nuisance areas only

Plant survey method: [X] Rake [X] Visual [ ] Other (specify)

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eel grass	X	60
Flat-stemmed pondweed		10
Chara spp.		10
Common naiad		10
Sago pondweed		10

Treatment Area #	3	LAT/LONG or UTM's	Center of bed @ N41.32234 W85.75774		
Total acres to be controlled	16	Proposed shoreline treatment length (ft)	10084	Perpendicular distance from shoreline (ft)	50
Maximum Depth of Treatment (ft)	6	Expected date(s) of treatment(s)	mid to late summer depending on plant growth		

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique and Hydrothol herbicide will be used for control of eel grass only in nuisance areas

Plant survey method: [ ] Rake [X] Visual [ ] Other (specify)

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eel Grass	X	65
Coontail		15
Sago pondweed		10
Chara		5
Eurasian watermilfoil		2
Richardson's pondweed		1
Variable pondweed		1
Common naiad		1

Page 3 of 6

Treatment Area #	4	LAT/LONG or UTM's	Center of bed @ N41.32483 W85.74374		
Total acres to be controlled	1.5	Proposed shoreline treatment length (ft)	609	Perpendicular distance from shoreline (ft)	50-100
Maximum Depth of Treatment (ft)	6	Expected date(s) of treatment(s)	mid to late summer depending on plant growth		

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique and Hydrothol herbicide will be used for control of eel grass only in nuisance areas

Plant survey method: [X] Rake [X] Visual [ ] Other (specify)

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eel grass	X	75
Coontail		15
Chara		5
Eurasian watermiloil		3
Richardson's pondweed		2

Treatment Area #	5	LAT/LONG or UTM's	Center of bed @ N41.32737 W85.75197		
Total acres to be controlled	2.75	Proposed shoreline treatment length (ft)	1735	Perpendicular distance from shoreline (ft)	50
Maximum Depth of Treatment (ft)	6	Expected date(s) of treatment(s)	mid to late summer depending on plant growth		

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique and Hydrothol herbicide will be used for control of eel grass only in nuisance areas

Plant survey method: [ ] Rake [X] Visual [ ] Other (specify)

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eel grass	X	80
Coontail		10
Chara		8
Water Stargrass		2

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Treatment Area #	6	LAT/LONG or UTM's	Center of bed @ N41.33011 W85.7602		
Total acres to be controlled	3.25	Proposed shoreline treatment length (ft)	1933	Perpendicular distance from shoreline (ft)	50
Maximum Depth of Treatment (ft)	6	Expected date(s) of treatment(s)	mid to late summer depending on plant growth		

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique and Hydrothol herbicide will be used for control of eel grass only in nuisance areas

Plant survey method: [X] Rake [X] Visual [ ] Other (specify)

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eel grass	X	80
Water Stargrass		5
Common naiad		5
Coontail		5
Chara spp.		5

Treatment Area #	7	LAT/LONG or UTM's	Center of bed @ N41.33741 W85.77077		
Total acres to be controlled	3.22	Proposed shoreline treatment length (ft)	2126	Perpendicular distance from shoreline (ft)	50
Maximum Depth of Treatment (ft)	6	Expected date(s) of treatment(s)	mid to late summer depending on plant growth		

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique and Hydrothol herbicide will be used for control of eel grass in nuisance areas

Plant survey method: [ ] Rake [X] Visual [ ] Other (specify)

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eel grass	X	40
Eurasian watermilfoil		20
Chara		10
Curlyleaf pondweed		10
Flat-stemmed pondweed		10
Richardson's pondweed		10

Treatment Area #	8	LAT/LONG or UTM's	Center of Bed @ N41.33295 W85.77929		
Total acres to be controlled	2.63	Proposed shoreline treatment length (ft)	1711	Perpendicular distance from shoreline (ft)	50
Maximum Depth of Treatment (ft)	6	Expected date(s) of treatment(s)	mid to late summer		

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique and Hydrothol herbicide will be used for control of eel grass in nuisance areas

Plant survey method: [X] Rake [X] Visual [ ] Other (specify)

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eel grass	X	30
Chara		30
Coontail		30
Common naiad		10

INSTRUCTIONS: Whoever treats the lake fills in "Applicant's Signature" unless they are a professional. If they are a professional company who specializes in lake treatment, they should sign on the "Certified Applicant" line.

Applicant Signature	Date
Certified Applicant's Signature	Date

FOR OFFICE ONLY

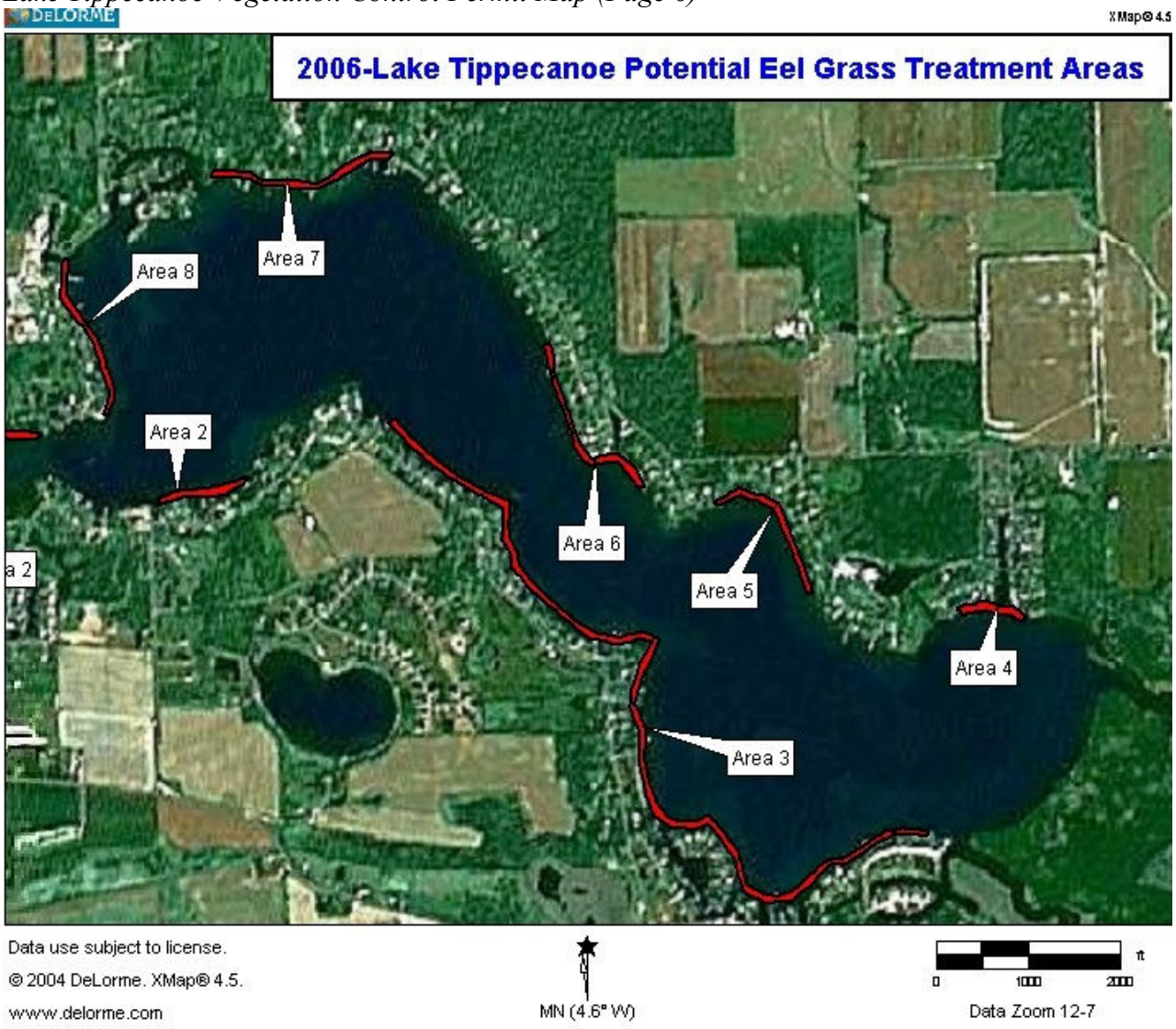
[ ] Approved [ ] Disapproved	Fisheries Staff Specialist
[ ] Approved [ ] Disapproved	Environmental Staff Specialist

Mail check or money order in the amount of $5.00 to:

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF FISH AND WILDLIFE
COMMERCIAL LICENSE CLERK
402 WEST WASHINGTON STREET ROOM W273
INDIANAPOLIS, IN 46204

AQUATIC CONTROL

Lake Tippecanoe-Vegetation Control Permit Map (Page 6)



2007 James Lake-Vegetation Control Permit Application

APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT
State Form 26727 (R / 11-03)
Approved State Board of Accounts 1987
[ ] Whole Lake [X] Multiple Treatment Areas
Check type of permit

INSTRUCTIONS: Please print or type information

FOR OFFICE USE ONLY
License No.
Date Issued
Lake County

Return to: Page 1 of 5
DEPARTMENT OF NATURAL RESOURCES
Division of Fish and Wildlife
Commercial License Clerk
402 West Washington Street, Room W273
Indianapolis, IN 46204

FEE: $5.00

Applicant's Name	Lake Assoc. Name	
Lake Tippecanoe POA	Lake Tippecanoe POA	
Rural Route or Street		Phone Number
67 EMS T49 A		574-834-2185
City and State		ZIP Code
Syracuse, IN		46567
Certified Applicator (if applicable)	Company or Inc. Name	Certification Number
		F38005
Rural Route or Street		
City and State		ZIP Code

Lake (One application per lake)	Nearest Town	County
Lake James	North Webster	Kosciusko
Does water flow into a water supply		[ ] Yes [X] No

Please complete one section for *EACH* treatment area. Attach lake map showing treatment area and denote location of any water supply intake.

Treatment Area # 1	LAT/LONG or UTM's	Treatment of Eurasian watermilfoil and curlyleaf where it occurs (see avmp update)
Total acres to be controlled <30 acres	Proposed shoreline treatment length (ft)	Perpendicular distance from shoreline (ft)
Maximum Depth of Treatment (ft) 18	Expected date(s) of treatment(s)	Early April (water temp dependent)

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Renovate or 2,4-D for EWM and low dose Aquathol K for curlyleaf pondweed

Plant survey method: [X] Rake [X] Visual [ ] Other (specify) Survey Results from May 2006 T1 survey

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Curlyleaf Pondweed	X	30
Coontail		15
Chara		15
Eurasian watermilfoil	X	10
Flatstem Pondweed		3
White water lily		5
Spatterdock		5
Sago pondweed		5
Eel Grass		10
Horned pondweed		1
Small pondweed		1

Treatment Area #	2	LAT/LONG or UTM's	Center of bed @ N41.32471 W85.73584		
Total acres to be controlled	1.75	Proposed shoreline treatment length (ft)	970	Perpendicular distance from shoreline (ft)	50
Maximum Depth of Treatment (ft)	6	Expected date(s) of treatment(s)	mid to late summer		

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique and Hydrothol herbicide will be used for control of eel grass in nuisance areas only

Plant survey method: [X] Rake [X] Visual [ ] Other (specify)

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eel grass	X	50
Coontail		45
Common naiad		5
Sago pondweed		5
Flat-stemmed pondweed		5

Treatment Area #	3	LAT/LONG or UTM's	Center of bed @ N41.32359 W85.72535		
Total acres to be controlled	1.86	Proposed shoreline treatment length (ft)	1190	Perpendicular distance from shoreline (ft)	50
Maximum Depth of Treatment (ft)	6	Expected date(s) of treatment(s)	mid to late summer depending on plant growth		

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique and hydrothol herbicide will be used for control of eel grass in nuisance areas only

Plant survey method: [X] Rake [X] Visual [ ] Other (specify)

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eel grass	X	40
Coontail		40
Common naiad		10
Chara spp.		5
Variable pondweed		5

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Treatment Area #	4	LAT/LONG or UTM's	Center of bed @ N41.31750 W85.72284		
Total acres to be controlled	1.5	Proposed shoreline treatment length (ft)	930	Perpendicular distance from shoreline (ft)	50-100
Maximum Depth of Treatment (ft)	6	Expected date(s) of treatment(s)	mid to late summer		

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique and hydrothol herbicide will be used for control of eel grass in nuisance areas only

Plant survey method: [X] Rake [X] Visual [ ] Other (specify)

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eel grass	X	40
Coontail		40
Chara spp.		10
Common naiad		5
Water stargrass		5

Treatment Area #		LAT/LONG or UTM's			
Total acres to be controlled		Proposed shoreline treatment length (ft)	channel	Perpendicular distance from shoreline (ft)	channel
Maximum Depth of Treatment (ft)		Expected date(s) of treatment(s)			

Treatment method: [ ] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control.

Plant survey method: [ ] Rake [ ] Visual [ ] Other (specify)

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community

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Treatment Area #	5	LAT/LONG or UTM's	Center of bed @ N41.31256 W85.72381		
Total acres to be controlled	1	Proposed shoreline treatment length (ft)	515	Perpendicular distance from shoreline (ft)	50-100
Maximum Depth of Treatment (ft)	6	Expected date(s) of treatment(s)	mid to late summer		

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique herbicide will be used for control of eel grass in nuisance areas only

Plant survey method: [X] Rake [ ] Visual [ ] Other (specify)

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eel grass	X	70
Chara		20
Coontail		10

INSTRUCTIONS: Whoever treats the lake fills in "Applicant's Signature" unless they are a professional. If they are a professional company who specializes in lake treatment, they should sign on the "Certified Applicant" line.

Applicant Signature	Date
Certified Applicant's Signature	Date

FOR OFFICE ONLY

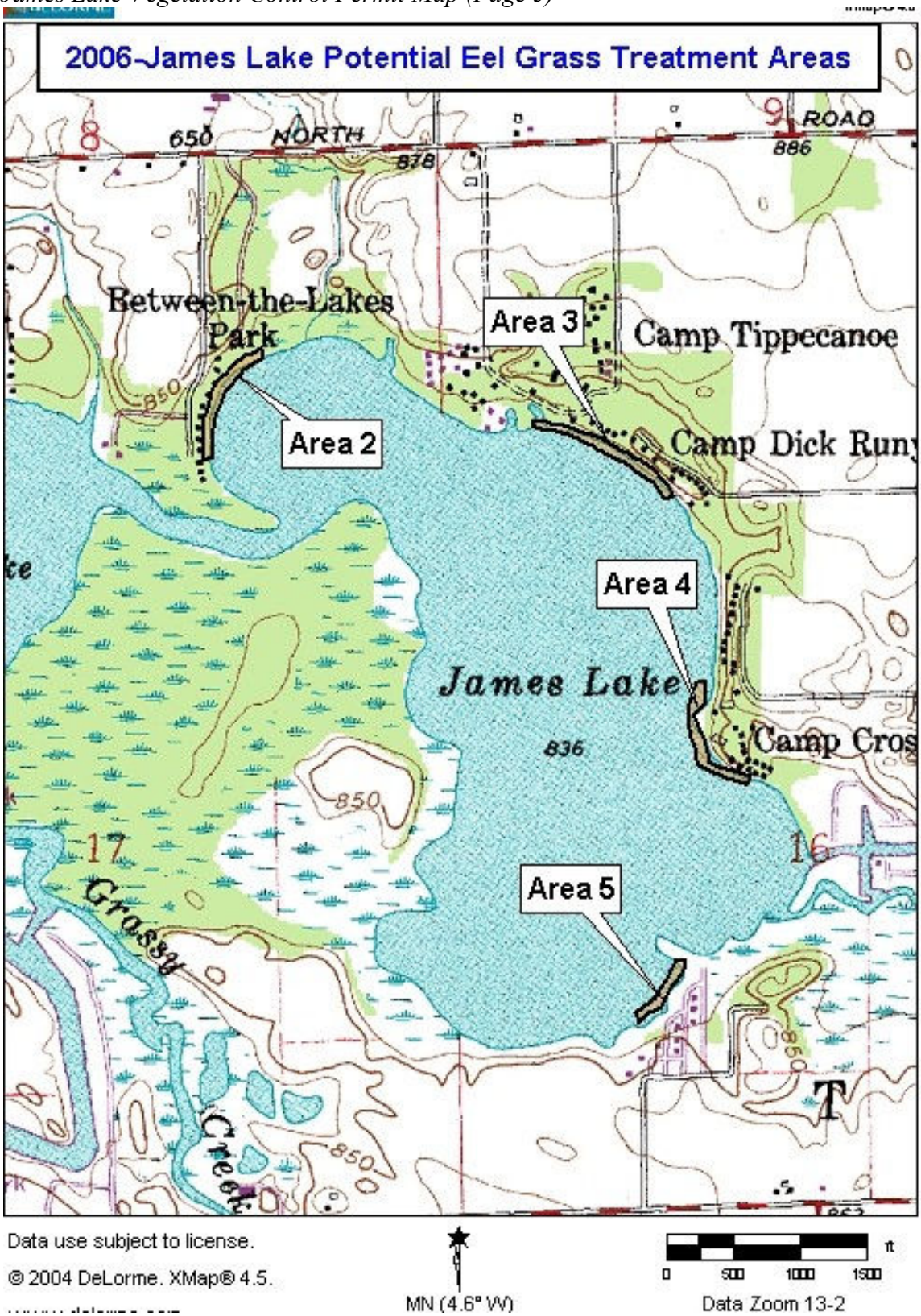
[ ] Approved [ ] Disapproved	Fisheries Staff Specialist
[ ] Approved [ ] Disapproved	Environmental Staff Specialist

Mail check or money order in the amount of $5.00 to:

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF FISH AND WILDLIFE
COMMERCIAL LICENSE CLERK
402 WEST WASHINGTON STREET ROOM W273
INDIANAPOLIS, IN 46204

AQUATIC CONTROL

James Lake-Vegetation Control Permit Map (Page 5)



2007 Oswego Lake-Vegetation Control Permit Application

APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT
State Form 26727 (R / 11-03)
Approved State Board of Accounts 1987
[ ] Whole Lake [X] Multiple Treatment Areas
Check type of permit

INSTRUCTIONS: Please print or type information

FOR OFFICE USE ONLY
License No.
Date Issued
Lake County

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DEPARTMENT OF NATURAL RESOURCES
Division of Fish and Wildlife
Commercial License Clerk
402 West Washington Street, Room W273
Indianapolis, IN 46204

FEE: $5.00

Applicant's Name	Lake Assoc. Name	
Lake Tippecanoe POA	Lake Tippecanoe POA	
Rural Route or Street		Phone Number
67 ENS T49A		812-497-2410
City and State		ZIP Code
Syracuse, IN		46567
Certified Applicator (if applicable)	Company or Inc. Name	Certification Number
Rural Route or Street		Phone Number
City and State		ZIP Code

Lake (One application per lake)	Nearest Town	County
Oswego Lake	North Webster	Kosciusko
Does water flow into a water supply		[ ] Yes [X] No

Please complete one section for *EACH* treatment area. Attach lake map showing treatment area and denote location of any water supply intake.

Treatment Area # 1	LAT/LONG or UTM's	Treatment of EWM and CLP throughout lake (areas determined following survey, no more than 20 acres)	
Total acres to be controlled <20 acres	Proposed shoreline treatment length (ft)		Perpendicular distance from shoreline (ft)
Maximum Depth of Treatment (ft) 18	Expected date(s) of treatment(s)	Early April for Curlyleaf and EWM (potential later treatment for EWM)	

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Renovate or 2,4-D granular for selective control of EWM and low dose Aquathol K for selective control of CLP (see 2006 avmp update)

Plant survey method: [X] Rake [X] Visual [ ] Other (specify) Overall results from May, 2006 Tier I survey

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Chara		25
Coontail		5
Curlyleaf Pondweed	X	30
Flatstem Pondweed		1
Variable watermilfoil		5
Eurasian Watermilfoil	X	25
Richardson's Pondweed		1
Illinois pondweed		1
Eel grass		2
American elodea		1
spatterdock		1
horned pondweed		1
white water lily		2

AQUATIC CONTROL

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Treatment Area # 2	LAT/LONG or UTM's Center of Bed @ N41.32923 W85.78409		
Total acres to be controlled 2.12	Proposed shoreline treatment length (ft) 2100	Perpendicular distance from shoreline (ft) 50	
Maximum Depth of Treatment (ft) 6	Expected date(s) of treatment(s) mid to late summer depending on plant growth		

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique and Hydrothol will be used to control eel grass only in nuisance areas after IDNR/LTPOA survey

Plant survey method: [X] Rake [X] Visual [ ] Other (specify)

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eel grass	X	30
Chara		20
Coontail		20
Spiny Naiad		5
Sago pondweed		5
Small Pondweed		5
Richardson's Pondweed		3
Flatstem Pondweed		3
Eurasian watermilfoil		3
Northern Watermilfoil		2
Curlyleaf pondweed		2
Bladderwort		2

INSTRUCTIONS: Whoever treats the lake fills in "Applicant's Signature" unless they are a professional. If they are a professional company who specializes in lake treatment, they should sign on the "Certified Applicant" line.

Applicant Signature	Date
Certified Applicant's Signature	Date

FOR OFFICE ONLY

[ ] Approved [ ] Disapproved	Fisheries Staff Specialist
[ ] Approved [ ] Disapproved	Environmental Staff Specialist

Mail check or money order in the amount of $5.00 to:

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Oswego Lake-Vegetation Control Permit Application Map (Page 3)